NASA CONTRACTOR REPORT 166477

(NASA-CR-166477) EFFECTS OF AERODYNAMIC INTERACTION BETWEEN MAIN AND TAIL ROTORS ON HELICOPTER HOVER PERFORMANCE AND NOISE (Textron Bell Helicopter) 343 p HC A15/MF A01 CSCL 01A G3/02

N83-23275

Unclas 11515

Effects of Aerodynamic Interaction Between Main and Tail Rotors on Helicopter Hover Performance and Noise

R.P. Menger
T.L. Wood
J.T. Beieger

CONTRACT NAS2-10771
February 1983

NASA

NASA CONTRACTOR REPORT 166477

Effects of Aerodynamic Interaction Between Main and Tail Rotors on Helicopter Hover Performance and Noise

Ross P. Menger
Tommie L. Wood
John T. Brieger
Bell Helicopter Textron Inc.
Fort Worth, Texas

Prepared for
Ames Research Center
Under Contract NAS2-10771

National Aeronautics and
Space Administration

Ames Research Center
Moffett Field, California 94035

PRECEDING PAGE BLANK NOT FILMED

CONTENTS

LIST OF FIGURES

LIST OF FIGURES (Cont'd)

LIST OF FIGURES (Cont'd)

LIST OF TABLES

SYMBOLS

A	rotor disk area = π (radius)^2 , m^2
C_F	fin force coefficient = $F/A_{T/R}\rho(\omega r)^2$
C_P	rotor shaft power coefficient = $P/A\rho V_T{}^3$
$C_{P_{M/R}}$	main rotor power coefficient
$C_{P_{T/R}}$	tail rotor power coefficient
C_T	rotor thrust coefficient = $T/A\rho V_T{}^2$
$C_{T_{M/R}}$	main rotor thrust coefficient
$C_{T_{NET}}$	net tail rotor thrust coefficient = $(T_{T/R}-F)/A_{T/R}\rho V_T{}^2$
$C_{T_{T/R}}$	tail rotor thrust coefficient
DB	sound pressure level, decibels referenced to 20μPa
DBA	"A" weighted sound pressure level
F	fin side force, N
H	drag force on main rotor, N
HOGE	hover out of ground effect
L	antitorque moment arm, m
M/R	main rotor
P	rotor shaft power, W
Q	rotor shaft torque, N-m
R	main rotor radius, m
r	tail rotor radius, m
S	area of fin swept by tail rotor, m^2

SYMBOLS (cont'd)

s	tail rotor/fin lateral separation, m
T	rotor thrust, N
T/R	tail rotor
V_T	rotor blade tip speed, m/sec
Y	lateral force on main rotor, N
ρ	mass density of air, kg/m^3
Ω	main rotor rotational speed, rad/sec
ω	tail rotor rotational speed, rad/sec

SUMMARY

A model test was conducted to determine the effects of aerodynamic interaction between main rotor, tail rotor, and vertical fin on helicopter performance and noise in hover out of ground effect (HOGE). The experimental data were obtained from hover tests performed with a .151 scale Model 222 main rotor, tail rotor and vertical fin. Of primary interest was the effect of location of the tail rotor with respect to the main rotor. Penalties on main rotor power due to interaction with the tail rotor ranged up to 3% depending upon tail rotor location and orientation. Penalties on tail rotor power due to fin blockage alone ranged up to 10% for pusher tail rotors and up to 50% for tractor tail rotors. The main rotor wake had only a second order effect on these tail rotor/fin interactions. Design charts are presented showing the penalties on main rotor power as a function of the relative location of the tail rotor. Also, findings on the effect of fin blockage ratio on tail rotor thrust are presented along with a comparison of these findings with previously published data. Significant changes in rotor noise levels were also observed. Increases in main rotor noise due to tail rotor position and the presence of the vertical fin ranged up to 6 and 5 dB, respectively. Increases in tail rotor noise due to tail rotor position ranged up to 5dB. In the pusher configuration, fin effects on tail rotor noise increased as interaction effects decreased. Detailed test data are presented in the appendices to this report. The program documented herein was sponsored by Contract (NAS2-10771) with the National Aeronautics and Space Administration, Ames Research Center.

ORIGINAL PAGE IS OF POOR QUALITY

INTRODUCTION

One of the least understood areas of helicopter performance has been the aerodynamic interaction between various components of the aircraft. Recent progress in helicopter aerodynamic technology has led to near optimum isolated hovering rotors; and only small further reductions in isolated main rotor power can be expected in the future. However, there are indications that a significant percentage of hover power may be expended due to unfavorable aerodynamic interaction between main and tail rotors. Thus, it has been suspected that a measurable reduction in total power required to hover might be attainable with proper location of the tail rotor with respect to the main rotor.

A number of studies of aerodynamic interaction on helicopters have been conducted. (See Ref. 1, 2, and 3) Although consideration of the particular interaction between main rotor, tail rotor, and vertical fin has been included in some of these studies, none have focused on the power critical flight condition of hovering OGE.

Research has also shown that the tail rotor tends to dominate the noise spectrum of helicopters in the hover condition (See Ref. 4 and 5). Tail rotor blade interaction with the main rotor trailing tip vortex causes induced spanwise and azimuthwise impulsive loading, which in turn increases both harmonic and broadband noise from the tail rotor.

The problem, then, is that the helicopter preliminary designer has had little information to guide him in locating the tail rotor with respect to the main rotor so as to minimize power losses and noise due to unfavorable aerodynamic interactions during HOGE. An acceptable analytical solution to this problem has yet to be developed. To provide some insight into the variation and magnitude of these interaction penalties on hover power and noise and to aid further development of analytical methods, an experimental approach to the problem has been undertaken and is the subject of this report.

The objective of the test was to develop criteria showing the effect of the longitudinal and vertical location of the tail rotor with respect to the main rotor on rotor power required to hover OGE. The resulting design criteria is presented in Figure 1. The contours in Figure 1 represent percent increase in main rotor power due to aerodynamic interaction with the tail rotor. These results are based on the representative fin blockages as shown and are a composite of test findings for both pusher and tractor tail rotor operation.

A literature survey as well as a survey of current helicopters was conducted to aid in determining the range of tail rotor locations and orientations to be tested. Results of the survey of tail rotor locations for many production helicopters are shown in Figure 2. Relative longitudinal and vertical spacings between the tail rotor hub and main rotor plane are shown in terms of tail rotor radius (r). All of the helicopters shown have close to minimum longitudinal spacing between main and tail rotors. The tail rotor centerline of rotation averages 1.1r aft of the main rotor blade tip. Vertical spacing of the tail rotor varies from about .5r above the plane of the main rotor to about 1.4r below. The main rotor plane, for the purposes of this study, was established as the horizontal plane of rotation at the intersection of the pitch change axis with the main rotor shaft. This reference plane is independent of blade coning.* The range of tail rotor spacings tested in Reference 3 were from 1.1r to 2.1r aft from the main rotor blade tip and vertically from 15r above to .5r below the plane of the main rotor. The grid of tail rotor locations established for this test is shown in Figure 1. Tail rotor locations ranged from 1.0r above the main rotor plane to 2.0r below, and from a minimum longitudinal spacing of 1.1r to 3.1r aft of the main rotor tip path plane. Identification of the specific grid points may be found in Figure A-10.

The model used in this test represents a single (main) rotor helicopter with antitorque (tail) rotor. The model components are a two-bladed main rotor, a two-bladed tail rotor and a vertical fin; all scaled (.151) from the Bell Model 222. A detailed description of the model components is presented in Appendix A. The effects of tail rotor/fin separation (s/r), fin blockage ratio (S/A), and tail rotor direction of rotation have been previously investigated. (See Reference 1 and 3). Variation of these parameters was minimized for this test. Two tail rotor fin separations were tested; one (s/r=.63) for all pusher tail rotor cases and one (s/r=.38) for all tractor tail rotor cases (see Fig. A-3). Two fin blockage ratios, i.e. fraction of the tail rotor disk blocked by the fin, were also employed, one (S/A=.18) for tail rotor locations at or above the main rotor plane and one (S/A=.39) for all tail rotor locations below the main rotor plane (see Fig. A-2). The lesser blockage ratio was considered representative of high tail rotors, whereas, the greater blockage ratio was considered representative of low tail rotors. Direction of rotation of the tail rotor was maintained as top blade aft throughout

*Total "live" coning was calculated for the model main rotor used in this test. This thrust dependent, total coning resulted in vertical displacements of the tip-path plane ranging from .28r to .35r above the reference main rotor plane.

ORIGINAL PAGE IS
OF POOR QUALITY

the test.

The discussion of test results, which follows, presents first the effects of aerodynamic interaction on rotor performance and second the effects on rotor noise. The appendices contain a detailed description of the test equipment, test procedure, and data reduction (Appendix A), tabulation of all aerodynamic performance data (Appendix B), main rotor performance plots (Appendix C), acoustic analysis of isolated rotor operation (Appendix D), and acoustics plots (Appendix E).

AERODYNAMIC PERFORMANCE

Interaction Effects on the Main Rotor

Aerodynamic interaction effects on main rotor performance were determined by comparing main rotor power measured during simulated yaw trim to power measured with the tail rotor stopped. The test procedure involved a sweep of main rotor thrust resulting in a range of thrust coefficients from approximately .002 to .0065. Tail rotor thrust was varied to maintain yaw trim. Tail rotor thrust requirements were a function of measured main rotor torque, longitudinal separation of the main and tail rotors, and fin side force. Tail rotor thrust required for yaw trim then was as follows:

$$\text{Required } T_{T/R} = (Q_{M/R} \div L) + F$$

In some cases, tail rotor thrust requirements exceeded the maximum thrust capability of the tail rotor. In these cases, the tail rotor was set to maximum collective pitch. Both the net thrust coefficient required for trim and the actual net thrust coefficient obtained are shown in the data tables of Appendix B. These untrimmed conditions did not appear to significantly affect the interaction penalty trends on main rotor power. Following these yaw trim sweeps, the tail rotor was stopped while another thrust sweep was made with the main rotor to obtain "isolated" rotor data as a baseline to determine the interaction penalties. The "isolated" main rotor data then was measured with the tail rotor and fin (for fin-on cases) in place. The effect of the vertical fin on the isolated main rotor was insignificant. A detailed description of the test procedure is given in Appendix A.

Plots of the variation of main rotor C_p with main rotor C_T for both the yaw trim and isolated rotor thrust sweeps of each test run are presented in Appendix C. The effects of interaction on main rotor power are expressed as the ratio of main rotor C_p with the tail rotor operating to main rotor C_p with the tail rotor stopped. These ratios are obtained by comparison of the curve fits of C_p versus C_T for the inter-

acting and isolated rotor cases. The variation of main rotor power ratio with main rotor C_T is also presented in Appendix C for each test run. The accuracy of these main rotor power ratios has been deteremined to be ±1% of full scale measured data. A more detailed description of the data reduction and data accuracies is presented in Appendix A. For the purpose of establishing the design guideline depicted in Figure 1, interaction penalties on main rotor power were determined at a selected main rotor C_T of .005. The corresponding main rotor disk loading at 30 kg/m^2 represents a full scale 1.0g hover maneuver. The effects of tail rotor location on main rotor performance at a main rotor C_T of .005 are shown in Figures 3 thru 6. Figures 3 and 4 show results for model configurations which included a vertical fin. Figures 5 and 6 show results for the limited number of fin-off cases. Interaction penalties on main rotor power ranged up to 2.5% for pusher tail rotor configurations and 3.5% for tractor tail rotor configurations when the vertical fin was installed. For the fin-on cases of Figures 3 and 4, the fin blockage ratio was .18 for tail.rotors located at or above the main rotor plane and .39 for tail rotor locations below the main rotor as shown. With the tail rotor positioned at minimum longitudinal spacing and .5r below the main rotor plane (grid point 17 of Fig. A-10), both the .18 and the .39 fin blockage ratios were tested. For the pusher tail rotor, the penalty on main rotor power was essentially the same (2%) for both blockage ratios at this grid point. However, for tractor tail rotor operation the interaction penalty on main rotor power was significantly higher for the low fin blockage; 3.2% increase in main rotor power for .39 fin blockage ratio versus 4.6% increase for a .18 fin blockage ratio.

Figures 5 and 6 show that interaction penalties on main rotor power were essentially the same for fin-off cases as compared to fin on cases for the more remote tail rotor locations. With the tail rotor located in close proximity to the main rotor, i.e. minimum longitudinal spacing and in the plane of the main rotor (grid point 2), the penalties on main rotor power were greater with no fin installed. The penalty on main rotor power with a tractor tail rotor at this position with no vertical fin was 5.1% versus 3.4% for .18 fin blockage and for pusher tail rotor 3.6% for no fin versus 2.2% for the .18 fin blockage ratio.

A 10° canted tail rotor configuration (thrusting up) with a fin blockage ratio of .18 was also tested with the tail rotor located at grid point 2. The vertical axis of the fin remained parallel to the main rotor shaft. Lateral separation between tail rotor and the fin (measured from the rotor hub) was maintained the same as for the uncanted

cases. For tractor tail rotor operation, the interaction penalty on main rotor power remained the same as for the uncanted tail rotor with the same disk blockage. For pusher tail rotor operation the canted tail rotor penalty on main rotor power was greater than the corresponding uncanted case; 3.0% for the canted tail rotor versus 2.2% for the uncanted tail rotor.

A contour map showing interaction penalties on main rotor power versus tail rotor location is shown for pusher tail rotor operation in Figure 7 and tractor tail rotor operation in Figure 8. These contours are based on the penalties resulting from the representative fin blockages of Figures 3 and 4. It can be seen that the contour lines for pusher versus tractor tail rotors are very similar in shape and spacing except that tractor tail rotor induced penalties are in general 1% (of main rotor power) greater than for the pusher tail rotor. This disparity held for fin-off cases as well.

During tractor tail rotor operation, the vertical fin has the effect of a ground plane for the tail rotor. Thus, the increased power penalty on the main rotor during tractor tail rotor operation with the fin may be the result of the interaction of "ground" vortices, created by the tail rotor downwash on the fin, with the main rotor wake. Such vortices would not be created by a pusher tail rotor because of the absence of any ground plane in the tail rotor downwash. This explanation still does not account for the greater penalty to the main rotor for tractor versus pusher tail rotor operation when no fin is installed. As seen in Figure 9, however, because of the lateral offset of the tail rotor, there is an appreciable difference in the relative position of the rotor wakes. Such a difference could be responsible for the greater main rotor penalty during tractor tail rotor operation without the fin. Another factor that cannot be ruled out as having some effect on the pusher versus tractor tail rotor effects seen in this test is the location of the tail rotor drive. As seen in Figure 9, the drive was positioned in the downwash of the pusher tail rotor. However, for tractor tail rotor cases, the drive was located on the inflow side of the tail rotor.

A tuft grid was placed in the tail rotor wake approximately 12r downstream as shown in Figures A-1 and A-4. The deflection of the tail rotor wake due to interaction with the main rotor was observed by noting the location of the wake impingement on the grid. A typical progression of tail rotor wake deflection with increasing thrust is shown in Figure 10. This case is considered representative of tail rotor locations which resulted in the greatest penalties on main rotor power, i.e. in close proximity to the main rotor

ORIGINAL PAGE IS
OF POOR QUALITY

tip path. In these cases, the tail rotor wake was typically deflected forward and down as shown. This deflection is believed to be strongly influenced by the interaction of the radial component of inflow to the main rotor and the tail rotor wake. It is possible that the downward deflection is due to the top-blade-aft swirl velocity of the tail rotor wake in the presence of main rotor radial inflow. In one trial run with the tail rotor operating top-blade-forward, there was no downward (or upward) deflection of the tail rotor wake. A qualitative assessment of the patterns of tail rotor wake deflection observed during the test supported the results presented in Figures 7 and 8. Increasing deflections as well as earlier onset, i.e., at lower thrust levels, correlated with increasing penalties on main rotor power. The greater main rotor power penalties for tractor tail rotor operation as compared to pusher operation were also associated with increased tail rotor wake deflection.

A composite contour map of interaction penalties on main rotor power which combines the results of pusher and tractor tail rotor operation is shown in Figure 1. The penalties are based on the representative fin blockages as shown. To account for the disparity between tractor versus pusher induced penalties observed in this test, the contour lines of Figure 1 have been assigned a one percentage point spread. Because of its general applicability, Figure 1 is intended as a design guide in considering the effect of the location of the tail rotor on main rotor power in HOGE.

Interaction Effects on the Tail Rotor

Fin blockage effects on tail rotor power are depicted in Figures 11 through 13. Plots of $C_{P_{T/R}}$ versus $C_{T_{NET}}$ for the tested fin blockage ratios of 0, .18, and .39 are presented in Figure 11 for a pusher tail rotor and Figure 12 for a tractor tail rotor. The $C_{T_{NET}}$ for stall is evidenced by the sharp break in the plotted data. The tail rotor data for thrust levels above the stall break is not considered representative of full scale hover interactions. Thus, tail rotor results presented in Figures 13 thru 17 are based on data measured below the onset of stall, i.e. $C_{T_{NET}} \leq .01$. The corresponding tail rotor disk loadings considered ranged from about 44 to 63 kg/m^2 and are considered representative of full scale loadings. Tail rotor/fin interaction effects on tail rotor power, expressed as a ratio of C_P (fin-on) / C_P (fin-off), versus fin blockage ratio, S/A, at a constant $C_{T_{NET}}$ = .01 are shown in Figure 13. Data from the 6/10

scale model test of Reference 1 shows good agreement.

Main rotor effects on the tail rotor/fin interaction are shown in Figures 14 and 15. In this figure the effect on tail rotor power is expressed as the ratio of $C_{P_{T/R}}$ (main rotor on)/$C_{P_{T/R}}$ (main rotor off). The effect of the main rotor on tail rotor power for trim conditions resulting in $C_{T_{NET}}$ = .01 (below tail rotor stall) was found to be small. However, because these effects were on the same order of magnitude as the accuracy of tail rotor power measurements, no design criteria was developed from these results.

Tail rotor/fin interference is often evaluated in terms of net tail rotor thrust. A lateral or side force which opposes tail rotor thrust is developed on the vertical fin during both tractor and pusher tail rotor operation. Net tail rotor thrust is defined as total thrust minus the fin force. Net thrust, then, is that portion of the total tail rotor thrust contributing to yaw trim. Figure 16 shows the variation of net tail rotor thrust with fin blockage ratio for pusher and tractor configurations. The ordinate axis is expressed in terms of the ratio of total thrust to net thrust. Data from References 1 and 3 are included. This plot depicts a linear or near linear increase in the ratio $C_{T_{T/R}}/C_{T_{NET}}$ with increasing fin blockage. The values of this ratio range up to about 1.075 for pusher tail rotors with high fin blockage and 1.50 for tractor tail rotors. None of the results presented here include effects of the main rotor. The effect of the presence of the main rotor wake on the net thrust produced by pusher tail rotors, is seen in Figure 17. The effect of the main rotor wake was seen to aggravate the fin losses resulting from the tail rotor/fin interaction above. These effects were negligible for tractor tail rotor operation.

ACOUSTICS

The acoustic analysis addressed changes in the harmonic and broadband noise sources of the main and tail rotors over the range of test variables. Harmonic noise is identified by discrete narrow peaks in the acoustic spectrum which occur at integer multiples of the blade passage frequency. Broadband noise consists of continuous multi-frequency sources whose peak level is determined at a characteristic center frequency. Both components are heard as independent noise sources with completely different aural signatures.

Scaling effects must be considered when applying the results found to full scale rotors. It is generally thought that harmonic noise can be directly scaled and without any problems (reference 7). However, several components of broadband noise are Reynolds number sensitive and so cannot always be directly scaled from model data. It is not the purpose of this test to research scaling laws for model data and so care must be taken when applying the test results related to broadband noise to the full scale situation.

Examination of the data primarily involved microphone 4, which was located directly aft of the tail rotor. At this location, the sound path between the rotors and the microphone was unobstructed. A main rotor thrust of 780 newtons and its associated tail rotor thrust of 62 newtons represent the normal disk loading in hover for the full scale rotor. These thrust levels are used in this report when a comparison is made between microphone locations or between tail rotor positions.

Sample acoustic spectra generated by model main and tail rotors are shown in Figures 18 and 19, respectively. Figure 18a shows the model main rotor fundamental harmonic (2/rev) to be 77 hertz, with associated harmonics at multiples of this fundamental frequency. The broad curve forming the base of the harmonics (denoted by a dashed line) is considered to be the broadband noise component. The frequency range over which broadband noise is maximum varied slightly with different thrust levels. The average center frequency of peak broadband noise was found to be 2000 hertz.

Figure 18b illustrates that the 2/rev and 6/rev components of Figure 18a also are seen to dominate the time history of that record. Higher harmonics up to 40/rev are also identifiable in the signal.

ORIGINAL PAGE IS
OF POOR QUALITY

The model tail rotor frequency spectrum shown in Figure 19a is similar to that of the main rotor, except that the tail rotor source frequencies shift to a higher frequency range. Another exception is the high amplitude component of 1/rev at 208 hertz and its associated higher harmonics at 3/rev, 5/rev, etc. This is believed to be due to different aerodynamic loading on each blade, caused by the blades being slightly out of track. This problem did not interfere with the test data of interest, since the fundamental harmonic at 416 hertz (2/rev) and its associated harmonics are substantially higher in amplitude than the harmonics caused by the slight out of track. As in the case of the main rotor, tail rotor broadband noise is shown to be the broad curve forming the base of the harmonics (dashed line) which peaks at about 3000 hertz. Because of its relatively low sound level, tail rotor broadband noise was difficult to extract from the data. In some cases, it was necessary to read peak levels at center frequencies greater than 3000 hertz.

Figure 19b shows that the tail rotor signal is made up of two primary harmonic tones, 2/rev and 4/rev. In some configurations, harmonics at 6-, and 8- and 10/rev are also of significance.

Isolated Rotors

An extended analysis of the isolated main and tail rotor acoustic data is presented in Appendix D. It discusses the effects due to the presence of the vertical fin, sound directionality around the rotors and temperature effects on the test data. It also presents a summary of baseline thrust sweeps for each rotor.

For the main rotor, this analysis shows that variations of noise with temperature were less than 3dB and so was considered not to be important for this test. The presence of the vertical fin was found to significantly increase main rotor 2/rev and broadband noise at the top forward tail rotor position. Main rotor noise was generally unaffected by the fin located at the other positions.

The presence of the fin when running the tail rotor alone was also found to be important. Tail rotor 4/rev was seen to increase up to 10dB because of the fin. A somewhat lesser impact was seen on tail rotor broadband noise. Placing the tail rotor in either pusher or tractor configuration was seen to have little difference on noise levels.

Representative test run data points are presented in Appendix E for isolated main rotor, isolated tail rotor and main rotor/tail rotor interaction cases. Thrust sweeps for microphone 4 and samples from the other five microphones at one thrust level are included. This data is discussed in Appendix D for the isolated rotor cases and in the following sections for the interaction cases.

Main Rotor/Tail Rotor Interaction

The model main and tail rotors, when operating together, resulted in a fairly balanced system acoustically where neither rotor completely dominated the noise spectrum. In all cases of primary interest, the noise components of both rotors were easily distinguishable.

Interaction effects between the main and tail rotors cause substantial and sometimes unpredictable changes in the noise spectrum produced. The interaction effects on each rotor are discussed separately in the following sections. The influence due to pusher and tractor configurations is also examined.

Interaction Effects on the Main Rotor. - Figures 20 and 21 show the effect of thrust level on main rotor fundamental harmonic (2/rev) and broadband noise for the tail rotor pusher and tractor configurations, respectively. Except for the top forward tail rotor position, both figures show little effect on the main rotor fundamental. The noise level at the top forward position remained about 6dB above the average of the other positions through the thrust range. This is believed to be due to the proximity of the fin to the main rotor tip and not to any rotor/rotor interaction effect. This is discussed in more detail in Appendix D. Test data showed that the second through the fifth harmonic acted similarly to the fundamental harmonic at each position. Harmonic above the fifth appeared not to be sensitive to interaction and were much more stable for the various tail rotor locations.

Figures 20b and 21b do show a significant increase in broadband noise for both the pusher and tractor configurations. The levels for the worst cases are approximately the same for both configurations, although the levels drop off faster for the pusher configuration to isolated rotor levels as the tail rotor is lowered or moved back (a decrease of 14-20 dB). The isolated main rotor runs, discussed earlier, showed main rotor broadband noise to increase because of the presence of the fin. The interaction runs showed no such change. Apparently, the interaction effects on the main rotor broadband noise were greater than the fin effects.

Interaction Effects on the Tail Rotor. - Figure 22 shows the interaction effect on tail rotor harmonic noise (average of 2-, 4-, 6- and 8/rev) for the pusher and tractor configurations. The noise level is seen to be maximum with the tail rotor located at or slightly below the main rotor plane and decreases slightly as the tail rotor is moved away from this central position. This shows that either a very high or very low tail rotor position is best for low harmonic noise. As the tail rotor is moved back in tractor configuration, the noise still decreases about two dB. As the tail rotor is moved back in pusher configuration, fin effects appear to predominate and increase noise levels by six dB from where it would have been without the fin in place. The larger spread of data in the pusher configuration than in the tractor configuration also shows more influence on that configuration by the main rotor.

Figure 23 shows the variation in noise levels with position for the first five tail rotor harmonics. The pusher and tractor configurations are compared at a typical operating thrust of 62 newtons. In the pusher configuration, the fundamental harmonic is greatly influenced by tail rotor position (a 15-20 dB spread); higher harmonics are influenced to a lesser extent (a 5-10 dB spread). In the tractor configuration, the fundamental harmonic does not tend to change a drastically (a variation of less than 8dB); higher harmonics tend to vary more (as much as 20dB), depending on tail rotor position. The increase in the second harmonic is seen in the pusher configuration as the tail rotor moves away from the area of highest interaction and the effect of the vertical fin increases. The fundamental harmonic is suppressed at the same time.

The effect on broadband noise is shown in Figure 24. In the pusher configuration, tail rotor position in and above the main rotor plane cause an increase in tail rotor broadband noise. The least interaction occurs well below the main rotor plane. In the tractor configuration, the broadband noise component is insensitive, for the most part, to tail rotor position. This close grouping is similar to the close grouping in the fundamental harmonic for the same configuration shown in Figure 22b.

SUMMARY OF RESULTS

A .151 scale model test was conducted to determine the effect of tail rotor location (with respect to the main rotor) and orientation (pusher versus tractor) on rotor performance and noise in hover out of ground effect. Effects of a vertical fin were included in the investigation.

Effects of Aerodynamic Interaction on Rotor Performance

1. Main rotor power required to hover out of ground effect was increased up to 3% over isolated main rotor power due to aerodynamic interaction with the tail rotor and vertical fin.

2. The interaction penalty on main rotor power was greatest with the tail rotor located in close proximity to the main rotor plane (i. e. within .5r above, below and aft of the minimal longitudinal spacing in the plane of the main rotor) and was more sensitive to longitudinal spacing than vertical spacing.

3. Interaction penalties on main rotor power were greater (by about 1% in terms of isolated main rotor power) for tractor tail rotor configurations than for pusher tail rotors.

4. With the tail rotor located in close proximity to the main rotor, interaction penalties on main rotor power were greater without the fin than with the fin installed.

5. The primary influence on tail rotor performance in hover out of ground effect was fin blockage. The main rotor wake and location of the tail rotor with respect to the main rotor had only a second order effect on the tail rotor/fin interaction.

6. The ratio of total to net tail rotor thrust required for yaw trim varied almost linearly with fin blockage ratio and ranged up to 1.50 for tractor tail rotors and 1.08 for pusher tail rotors with a fin blockage equal to 39% of the tail rotor disk area.

Effects of Aerodynamic Interaction on Rotor Noise

1. Main rotor noise increased up to 6dB when the tail rotor was located at/or above and in close proximity to the main rotor plane. This effect diminished and eventually disappeared as the tail rotor was moved below the main rotor plane or away from the main rotor.

ORIGINAL PAGE IS
OF POOR QUALITY

2. The presence of the fin at the top forward position caused an increase of up to 5dB in the main rotor fundamental harmonic noise and smaller increases in main rotor broadband noise. The presence of the fin showed little effect on main rotor noise at the other tail rotor locations.

3. The harmonic noise level for tail rotors located at minimum longitudinal spacing from the main rotor was noticeably less for the extreme high and low tail rotor locations.

4. The presence of the vertical fin was seen to cause a significant increase in harmonic noise for the pusher tail rotor. This fin effect increased as the pusher tail rotor was moved down and then away from the main rotor. The vertical fin showed little effect on tractor tail rotor noise during the hover interaction.

ORIGINAL PAGE IS
OF POOR QUALITY

REFERENCES

1. Lynn, R. R.; Robinson, F. D.; Batra, N. N.; and Duhon, J. M.: Tail Rotor Design Guide, Part I - Aerodynamics. Journal of the American Helicopter Society, Vol. 15, No. 4, 1970

2. Sheridan, P. F.; and Smith, R. P.: Interactional Aerodynamics - A New Challenge to Helicopter Technology. AHS Reprint 79-59, 1979.

3. Wiesner, W.; and Kohler, G.: Tail Rotor Design Guide. USAAMRDL TR 73-99, 1974.

4. Barlow, W. H.; McCluskey, W. C.; Ferris, H. W.: OH-6A Phase II Quiet Helicopter Program. USAAMRDL TR 72-79, September 1972

5. Leverton, J. W.: Reduction of Helicopter Noise by Use of a Quiet Tail Rotor. Vertica, Vol. 6, 1982 pp. 37 to 47.

6. Gessow, A.; and Myers, G.: Aerodynamics of the Helicopter. Frederick Ungar Publishing Co., 1952.

7. Schmitz, F.; Boxwell, D.; Lewy, S.; Dahan, C.: A Note on the General Scaling of Helicopter Blade-Vortex Interaction Noise. Presented at the 38th Annual Forum of the American Helicopter Society, May, 1982.

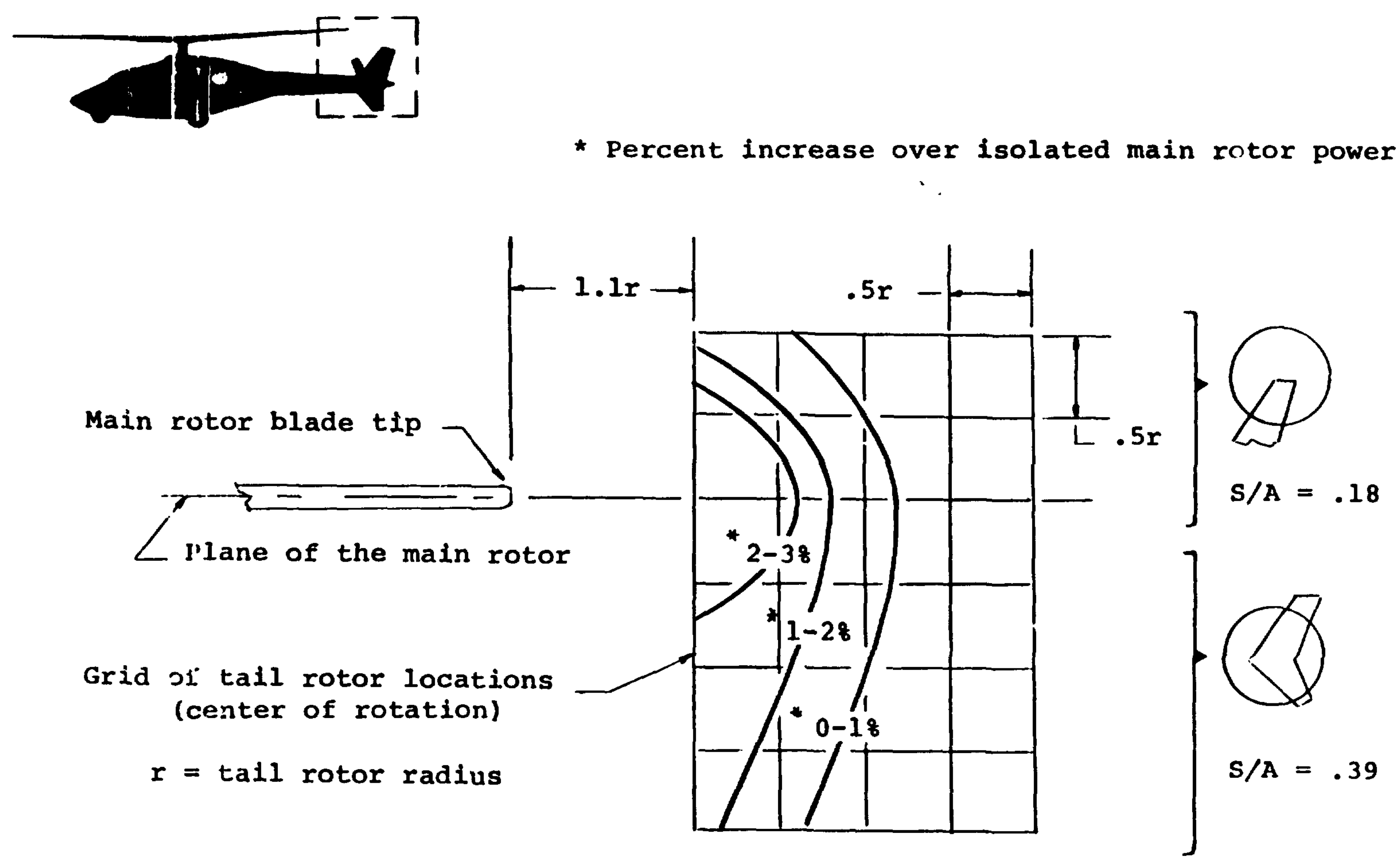
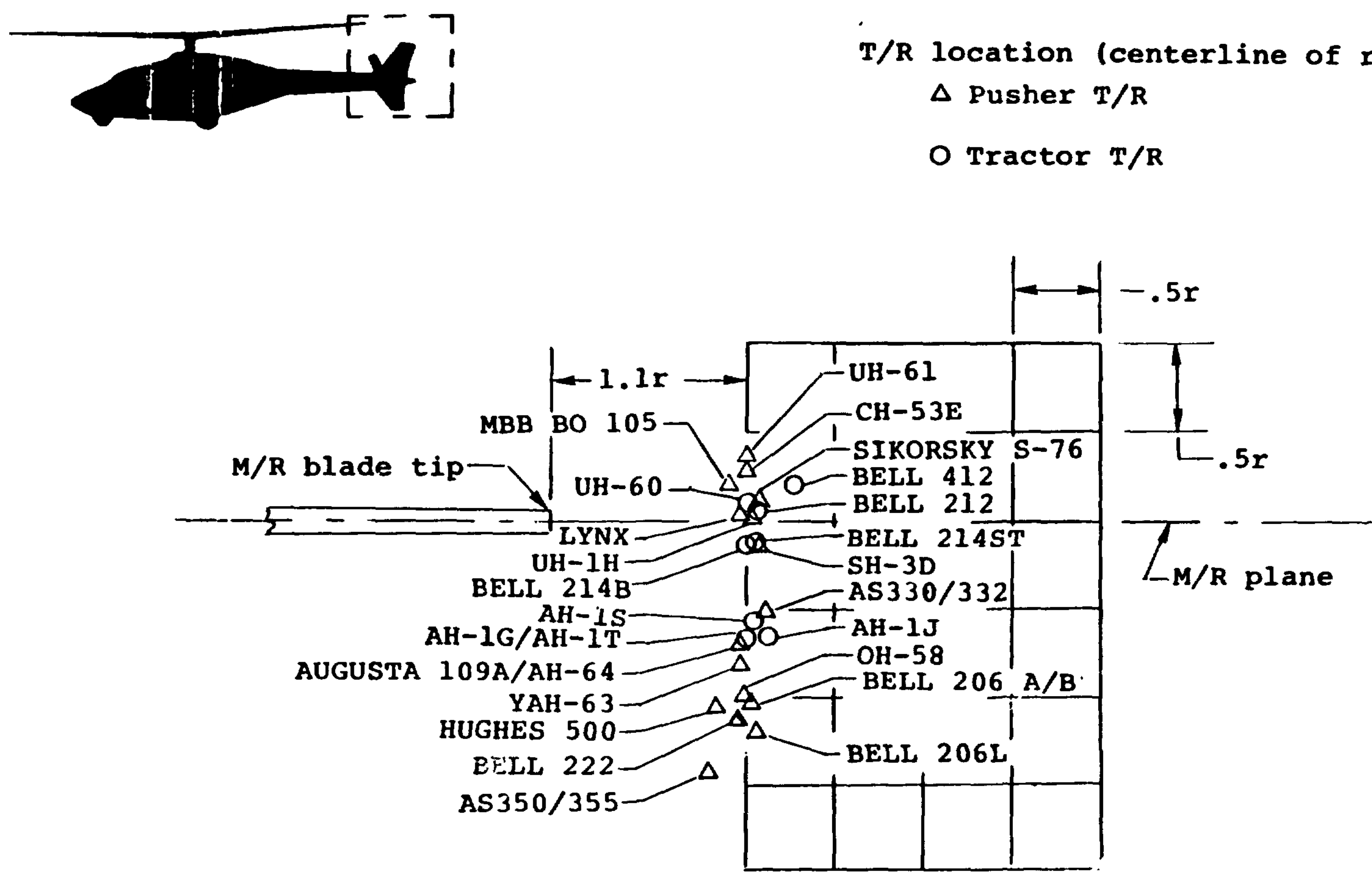


Figure 1. Tail rotor location design guide - Effect of tail rotor location on main rotor power in HOGE.



ORIGINAL PAGE IS OF POOR QUALITY

Figure 2. Historical survey of relative location of the tail rotor.

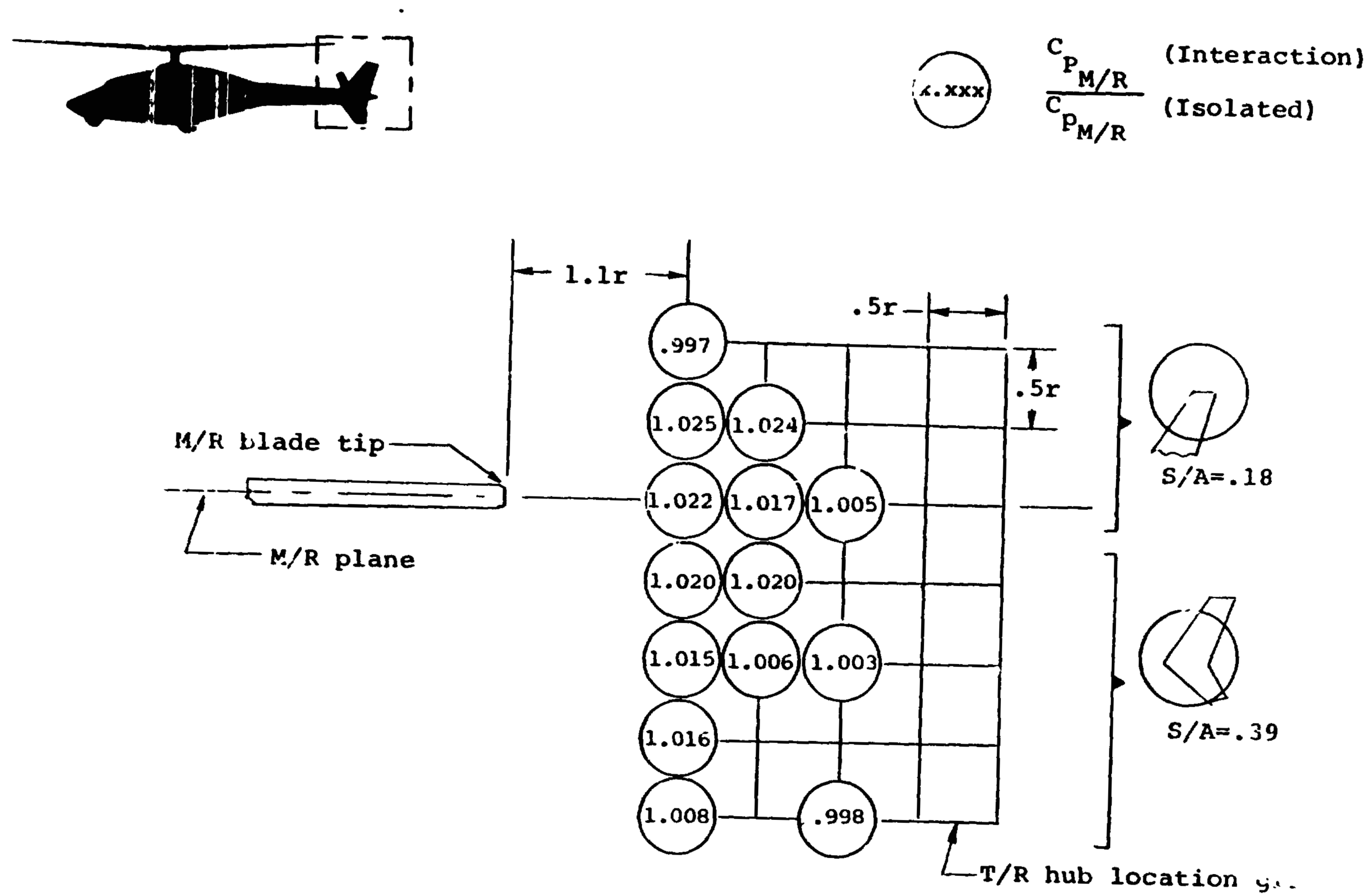


Figure 3. Effect of pusher tail rotor location on main rotor power in HOGE, fin-on, $C_{T_{M/R}} = .005$.

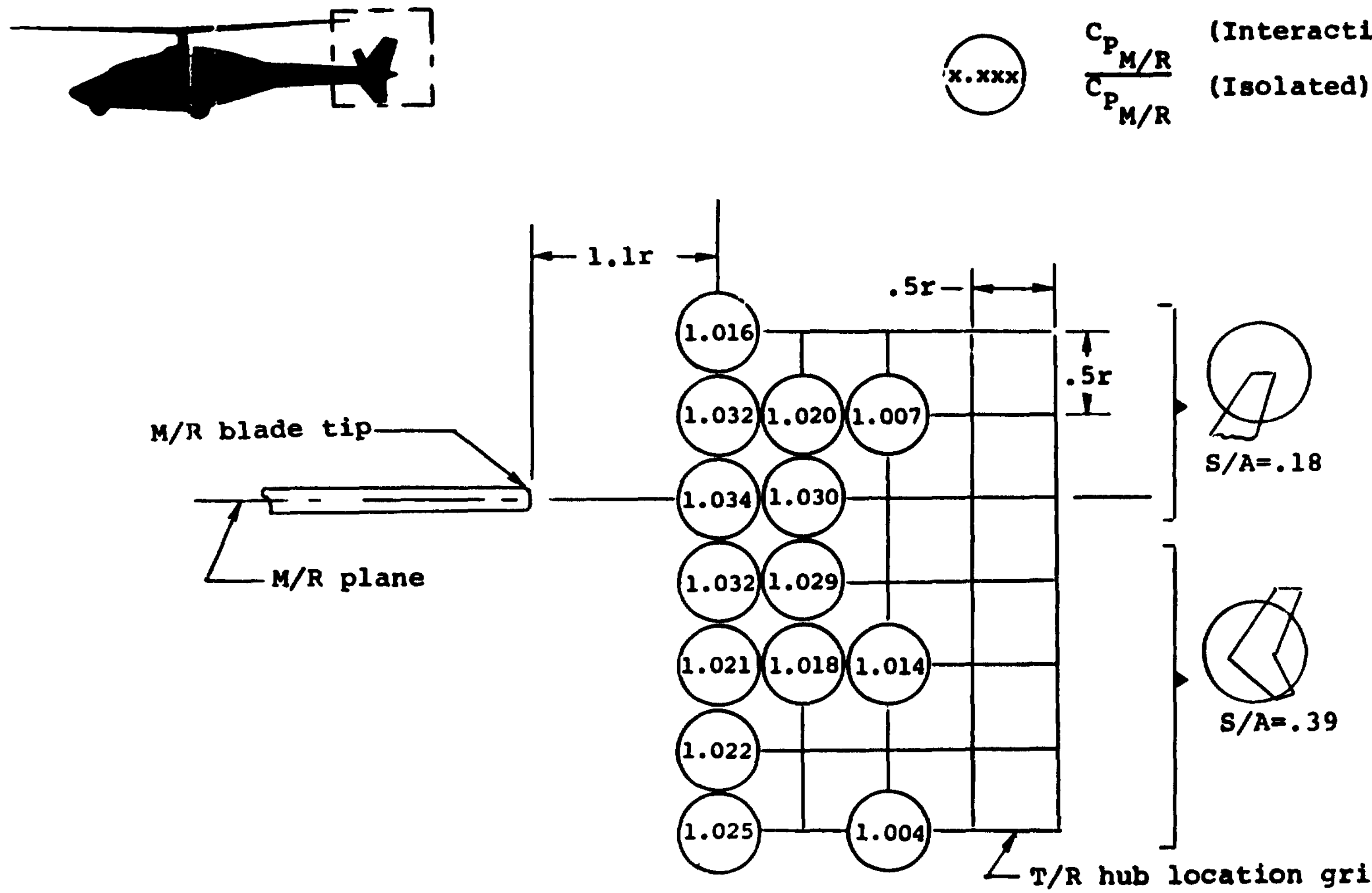


Figure 4. Effect of tractor tail rotor location on main rotor power in HOGE, fin-on, $C_{T_{M/R}}$ =.005.

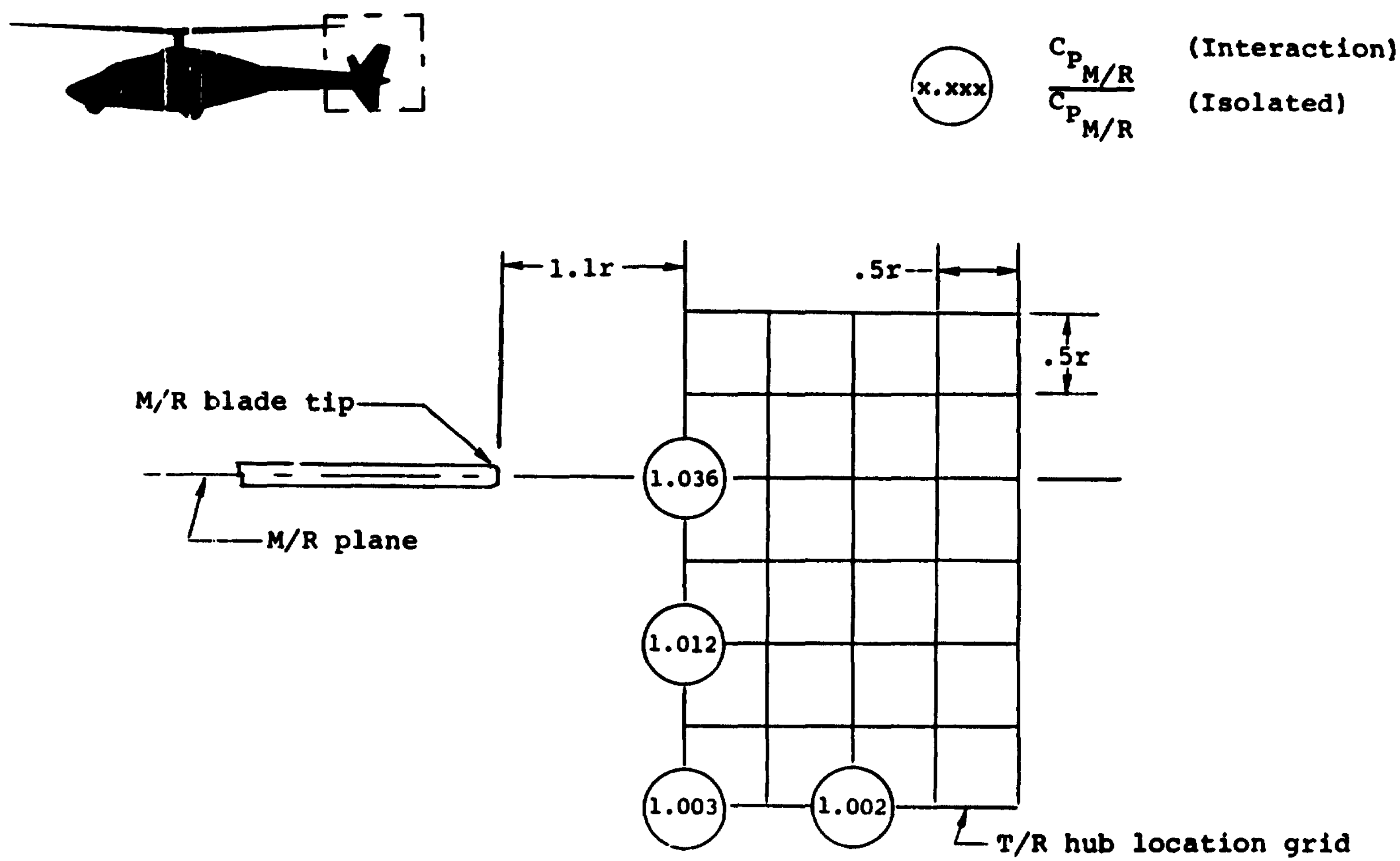


Figure 5. Effect of pusher tail rotor location on main rotor power in HOGE, fin-off, $C_{T_{M/R}} = .005$.

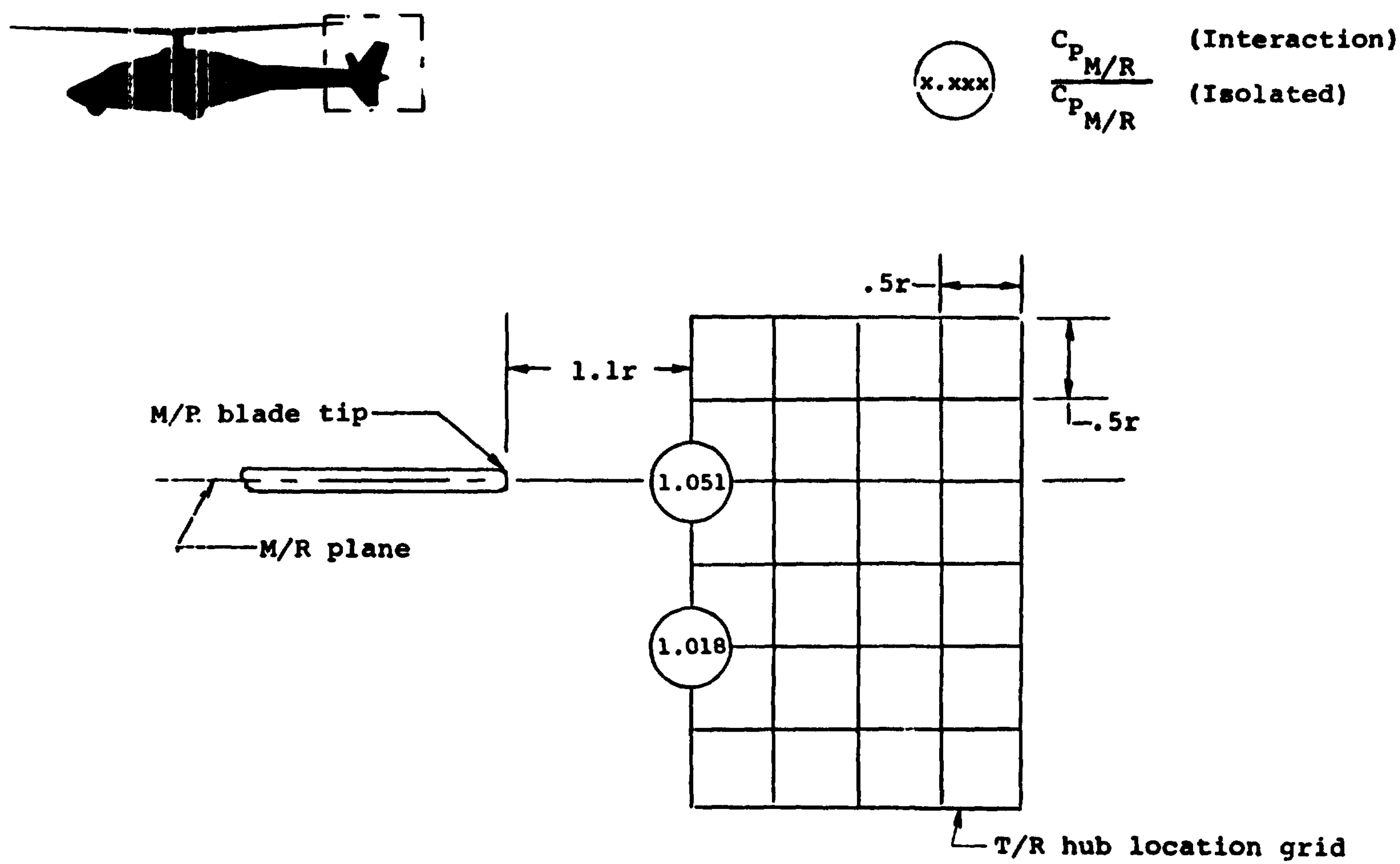


Figure 6. Effect of tractor tail rotor location on main rotor power in HOGE, fin-off, $C_{T_{M/R}} = .005$.

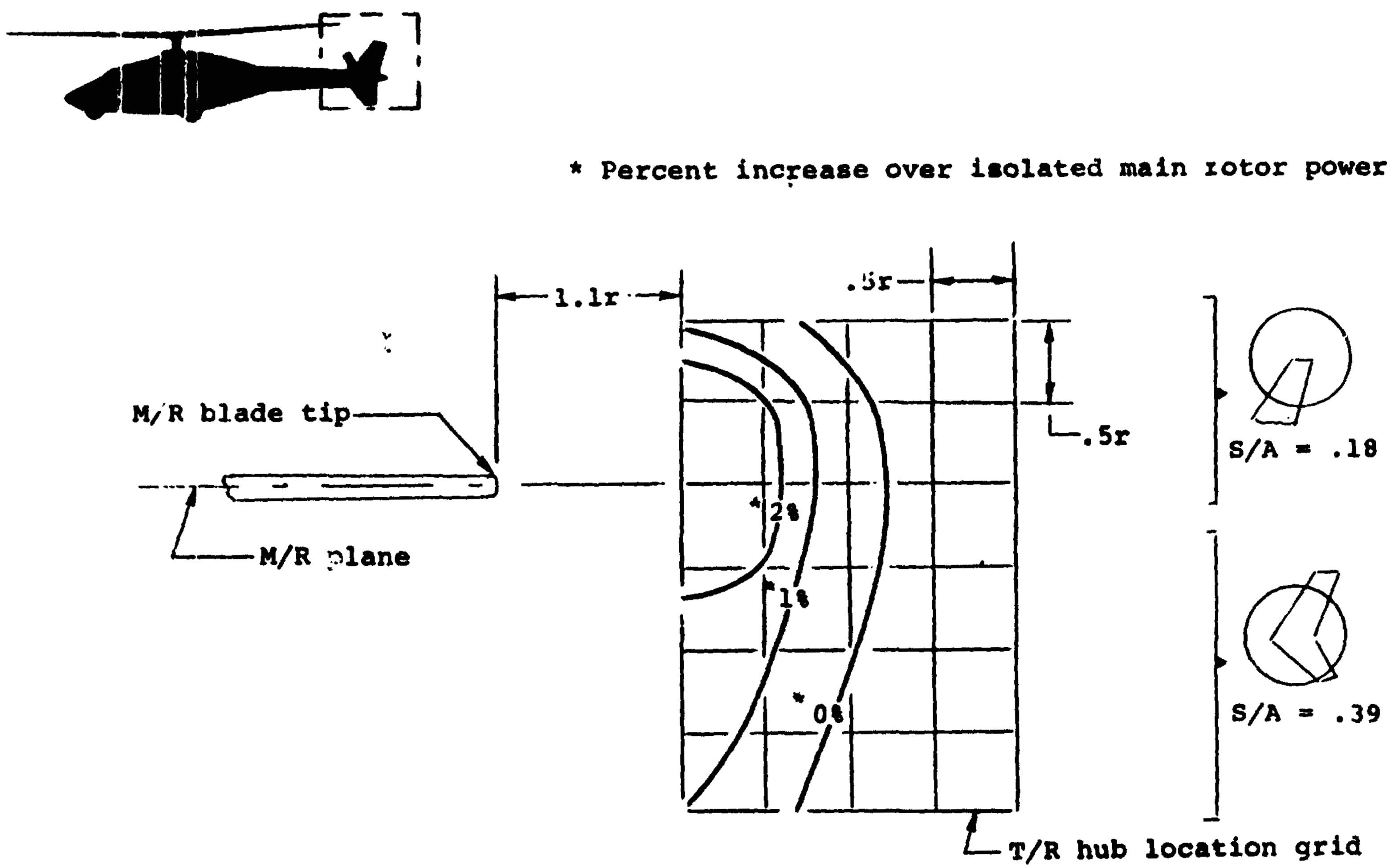


Figure 7. Contour map of the effect of pusher tail rotor location on main rotor power in HOGE, fin-on, $C_{T_{M/R}} = .005$.

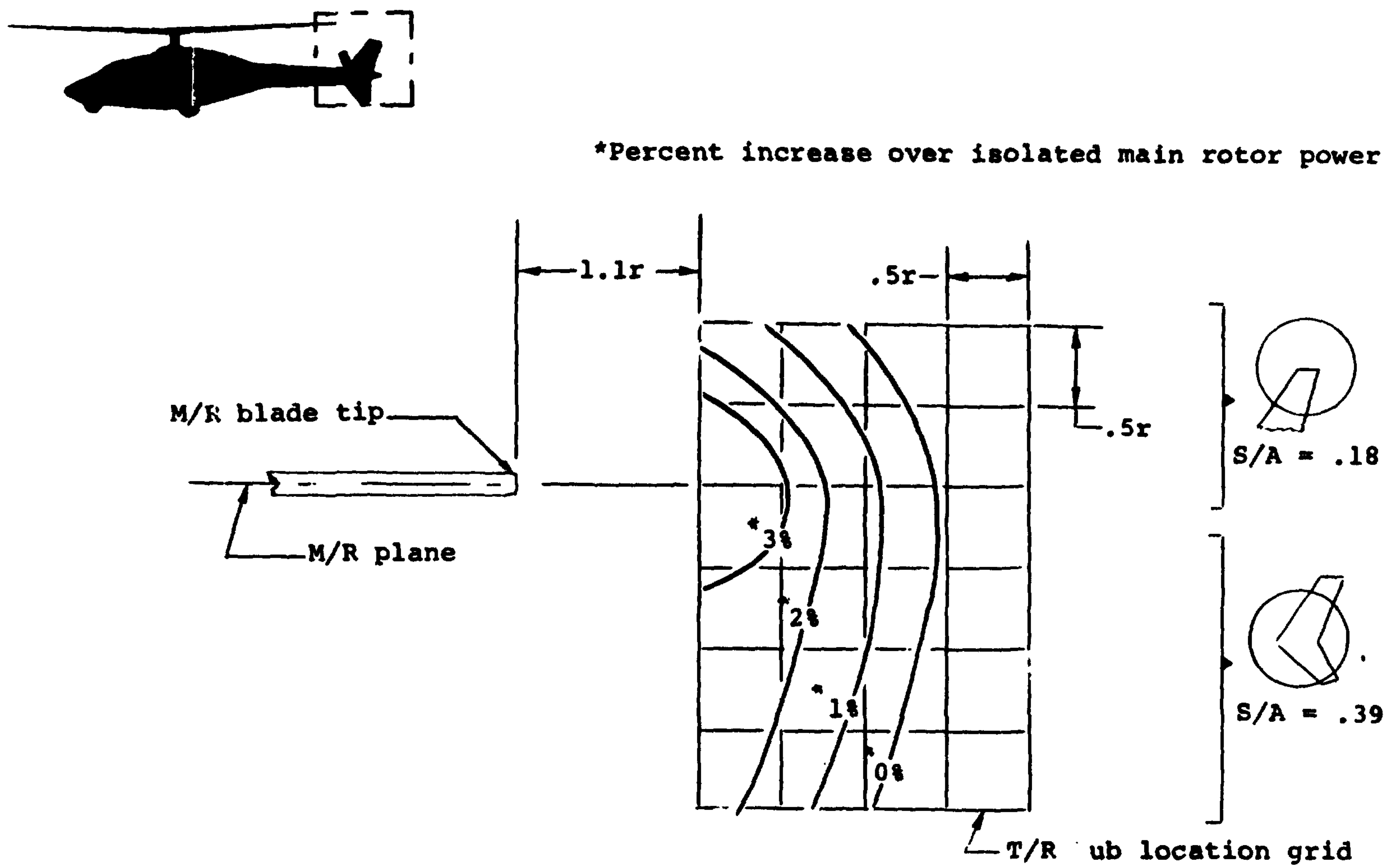


Figure 8. Contour map of the effect of tractor tail roto: location on main rotor power in HOGE, fin-on, $C_{T_{M/R}} = .005$.

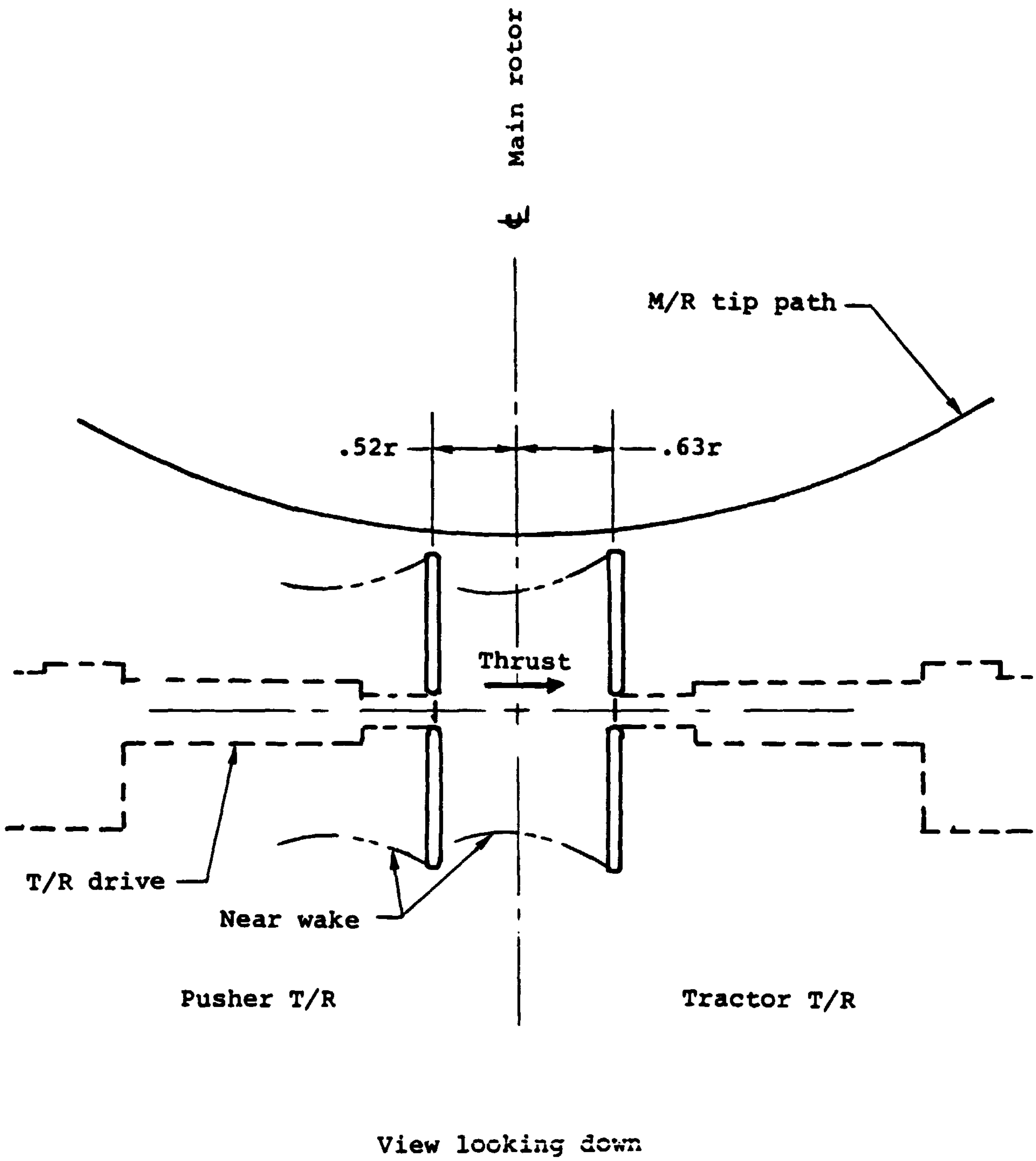


Figure 9. Effect of lateral positioning of the tail rotor on rotor wake proximity.

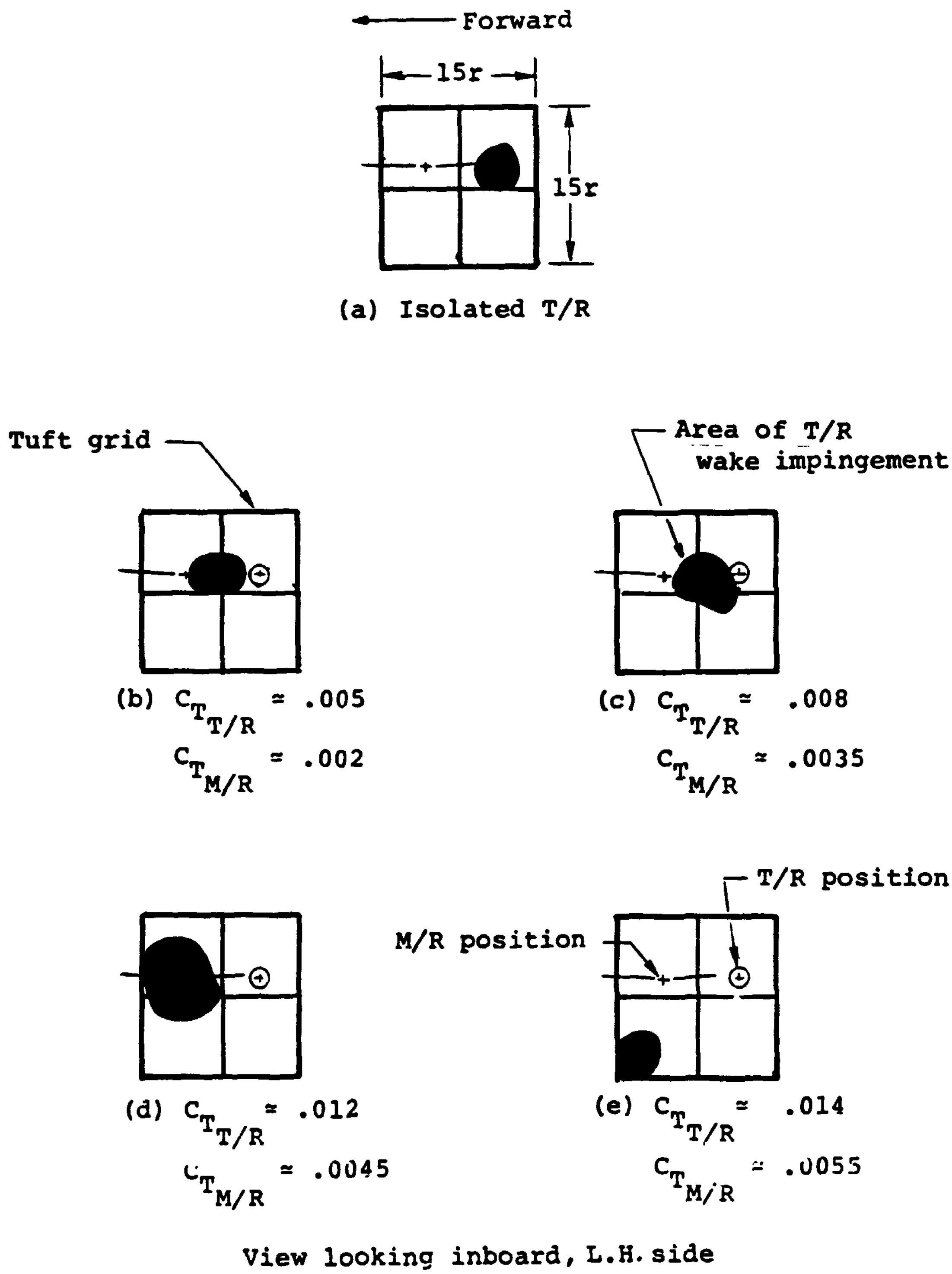


Figure 10. Tuft pattern indication of tail rotor wake displacement due to rotor/rotor interaction, pusher tail rotor in the plane of the main rotor, fin-off.

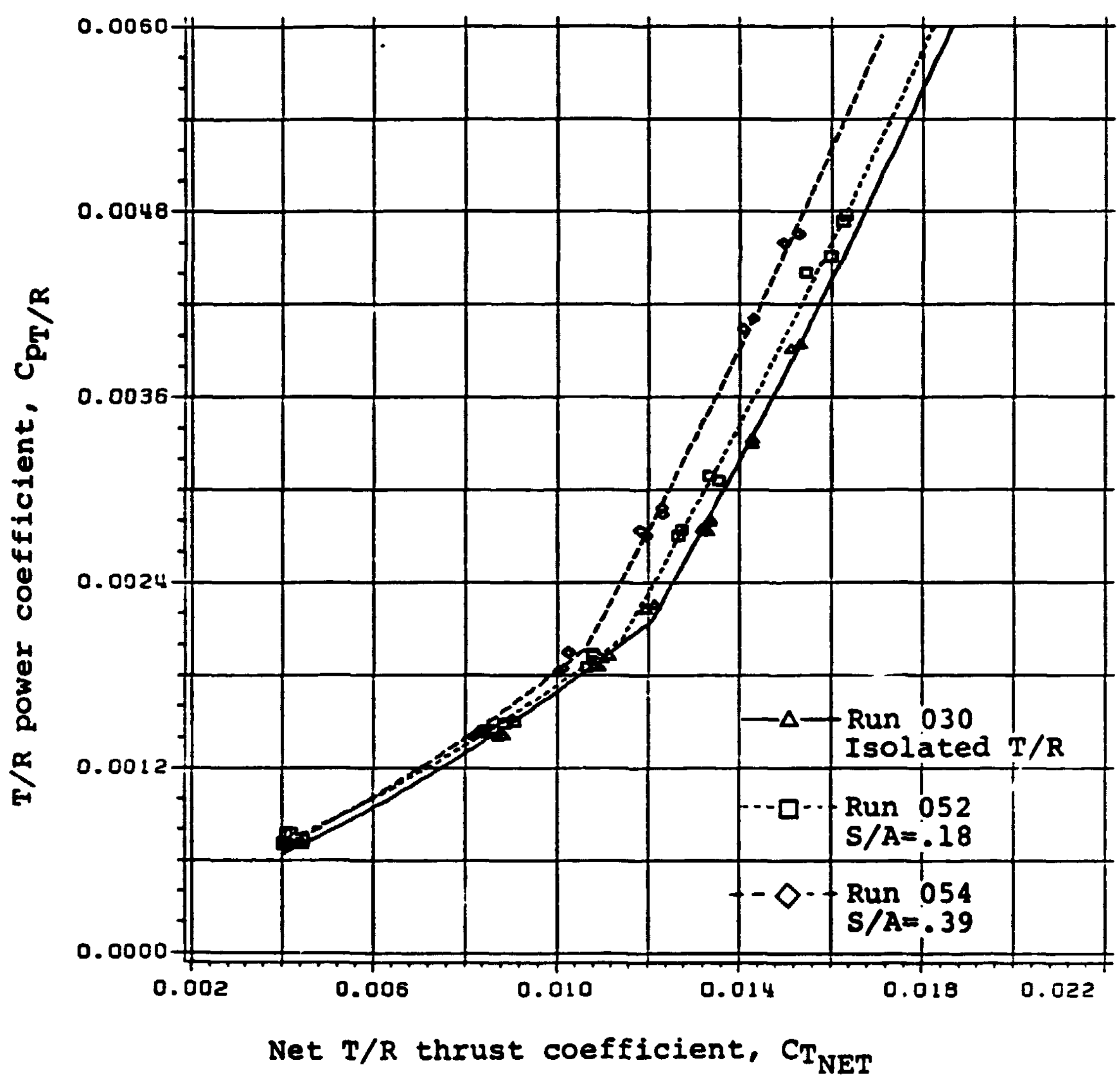


Figure 11. Effect of fin blockage on pusher tail rotor C_P vs. $C_{T_{NET}}$, main rotor off.

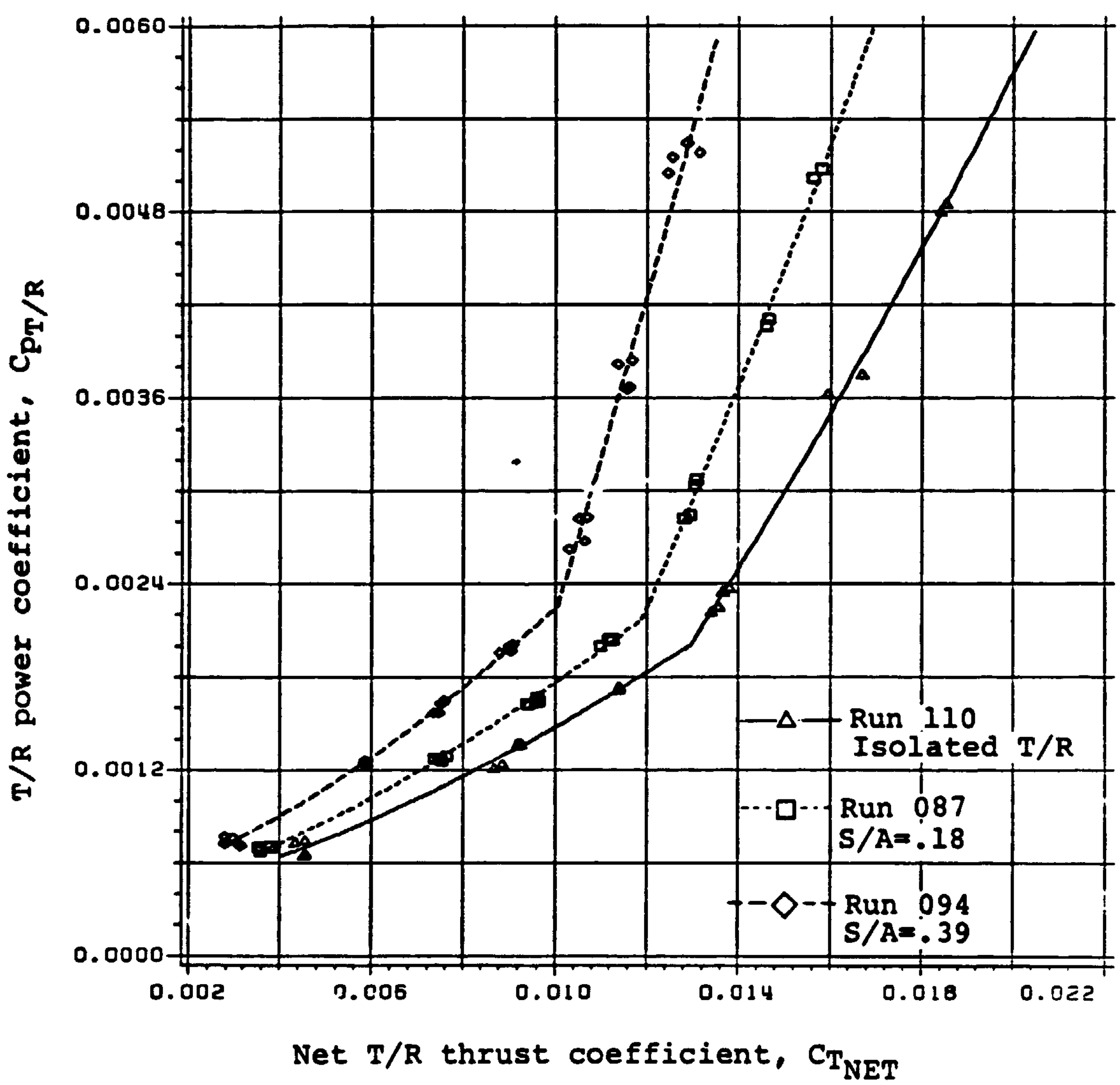


Figure 12. Effect of fin blockage on tractor tail rotor C_P vs. $C_{T_{NET}}$, main rotor off.

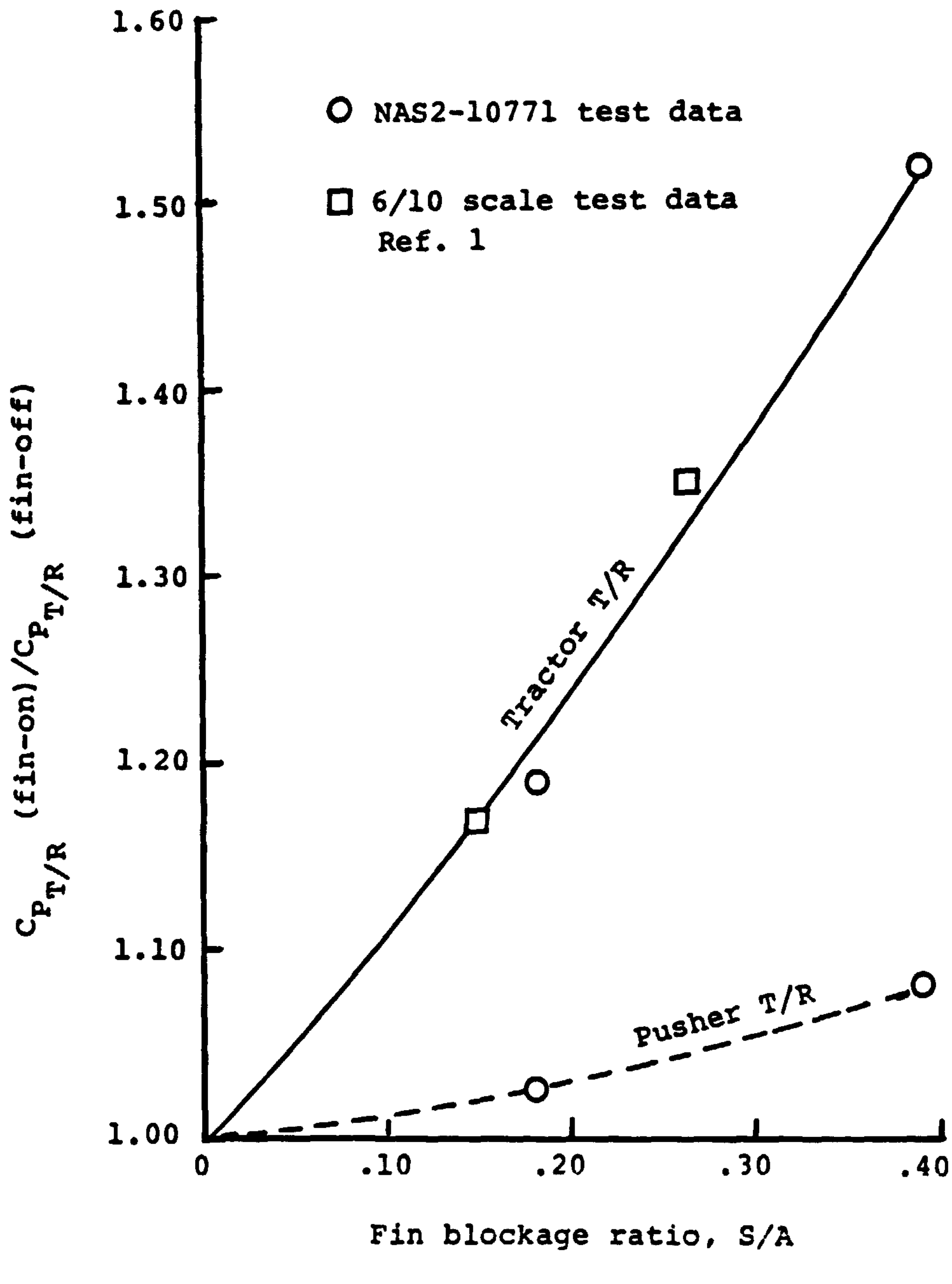


Figure 13. Effect of fin blockage on tail rotor power, main rotor off, $C_{T_{NET}} = .01$

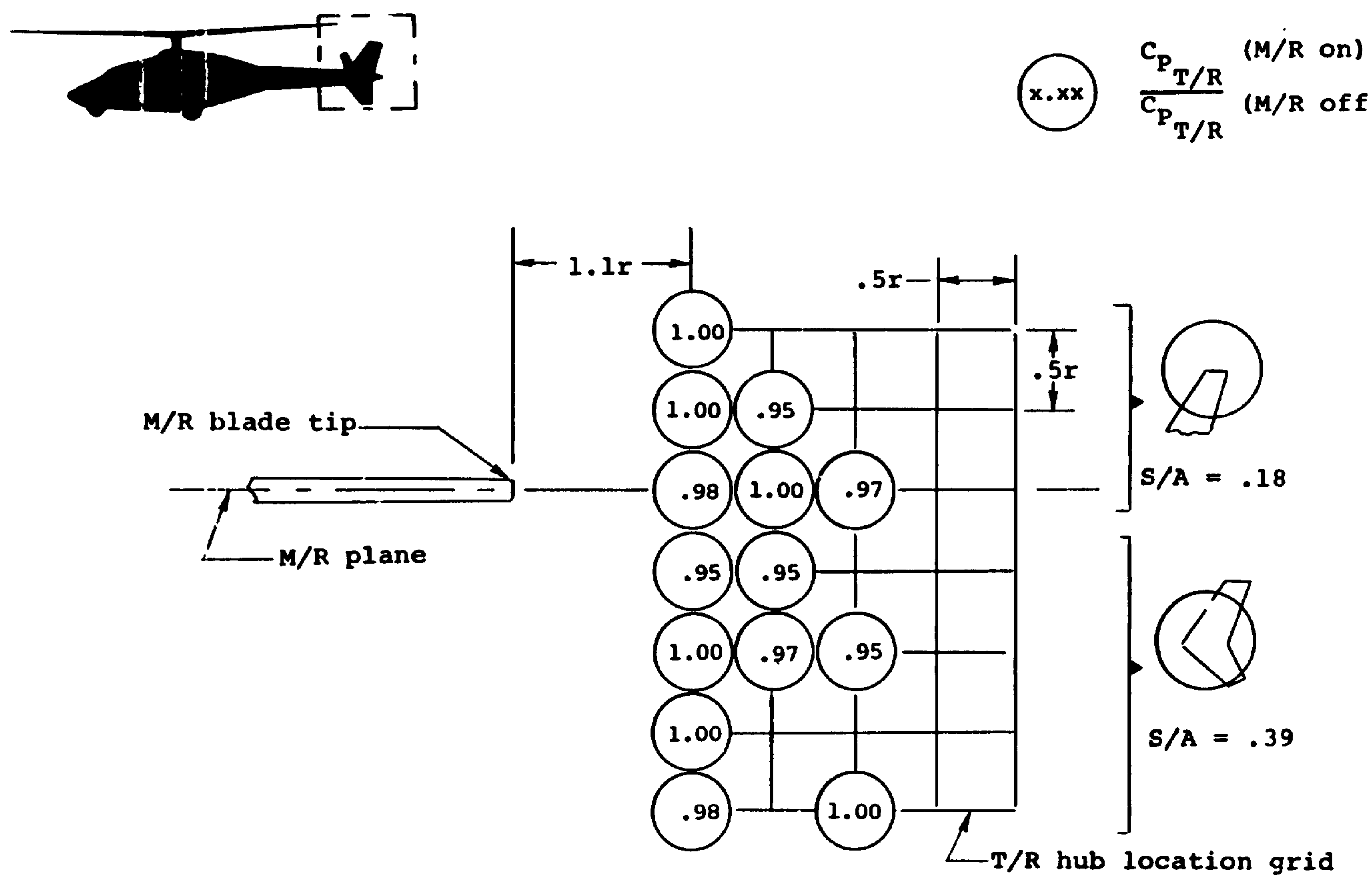


Figure 14. Effect of main rotor on tail rotor power by tail rotor location, pusher tail rotor, fin-on, $C_{T_{NET}} = .01$

ORIGINAL PAGE IS OF POOR QUALITY

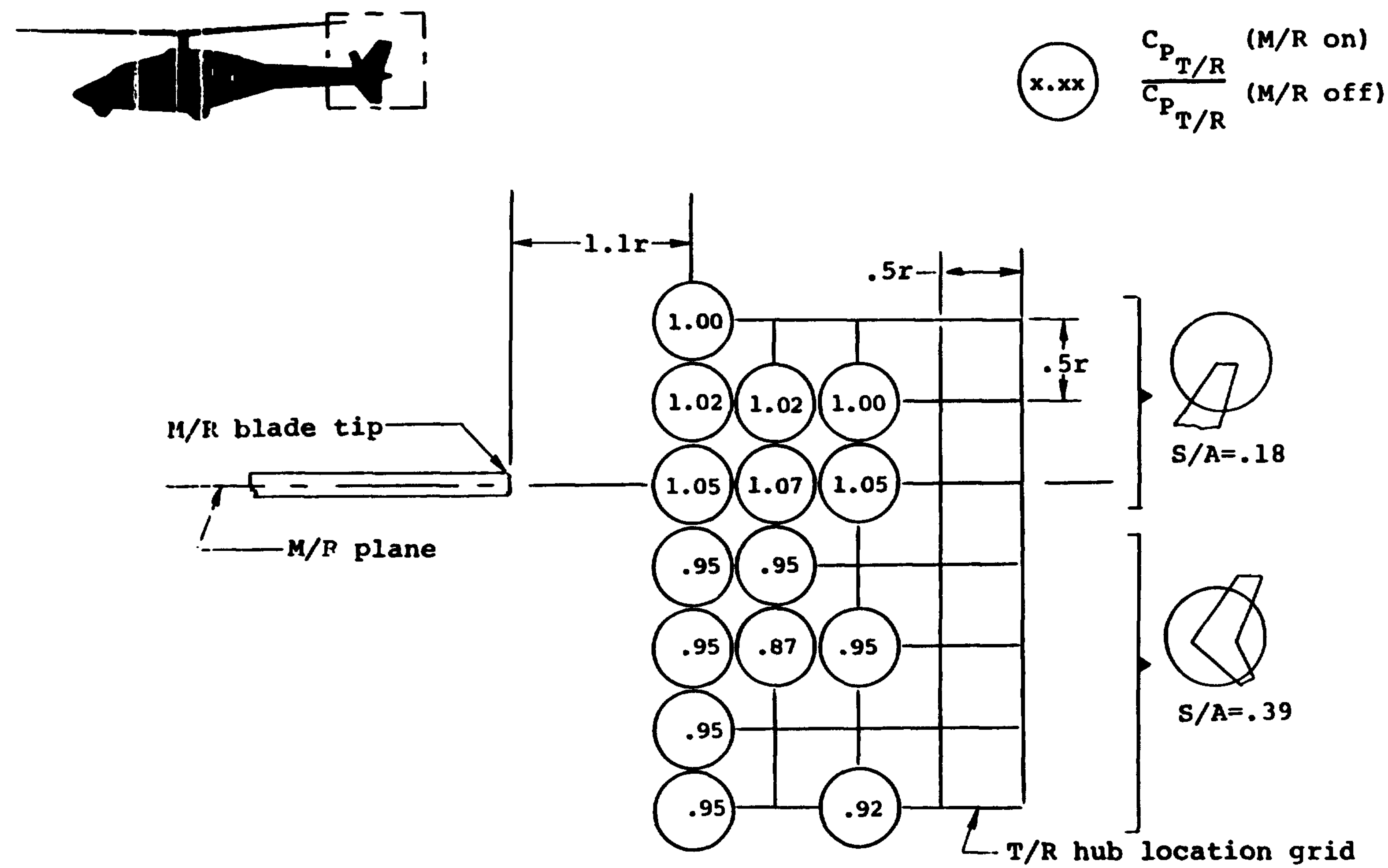


Figure 15. Effect of main rotor on tail rotor power by tail rotor location, tractor tail rotor, fin-on, $C_{T_{NET}} = .01$

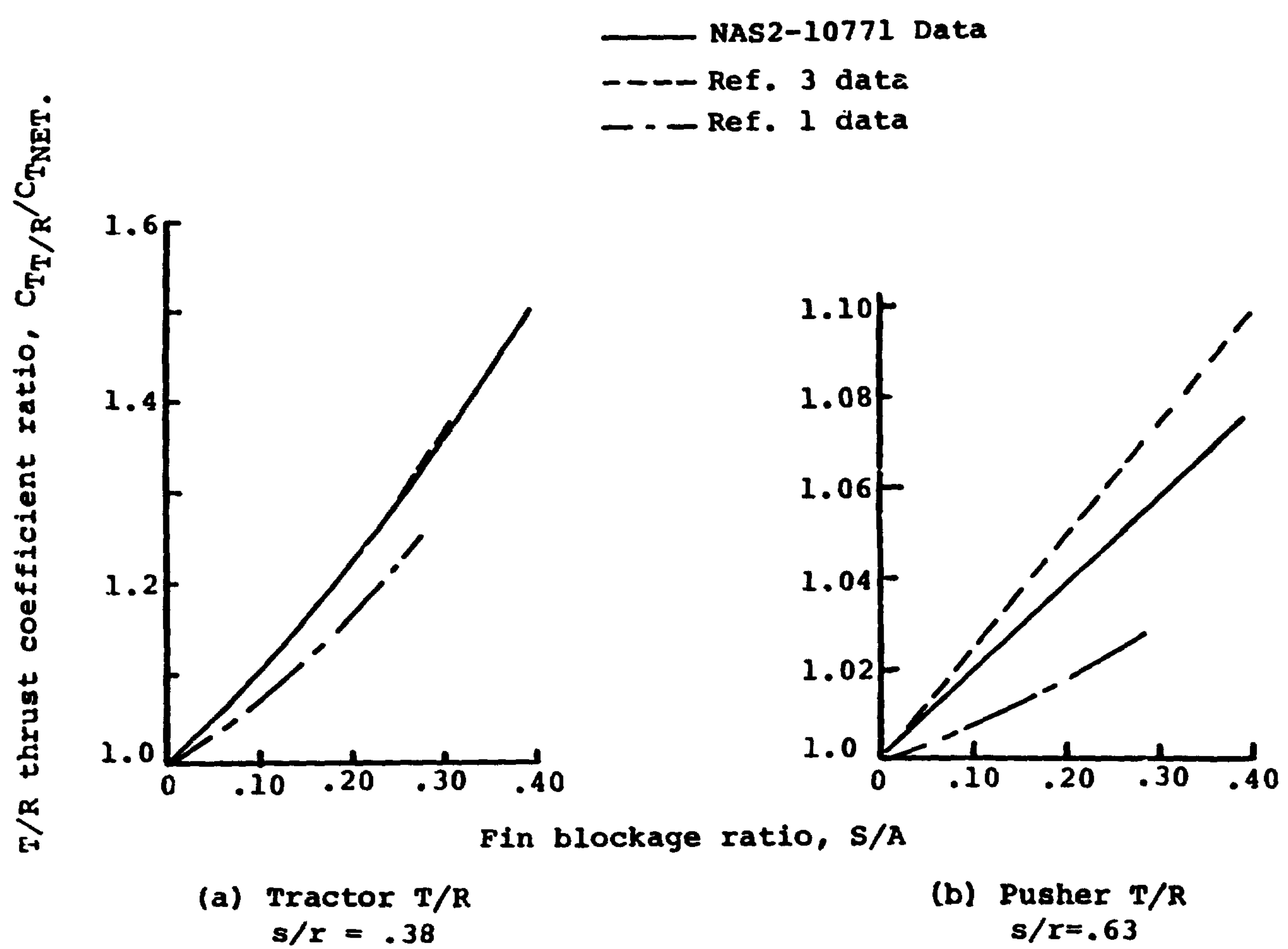


Figure 16. Effect of fin blockage on net tail rotor thrust, main rotor off.

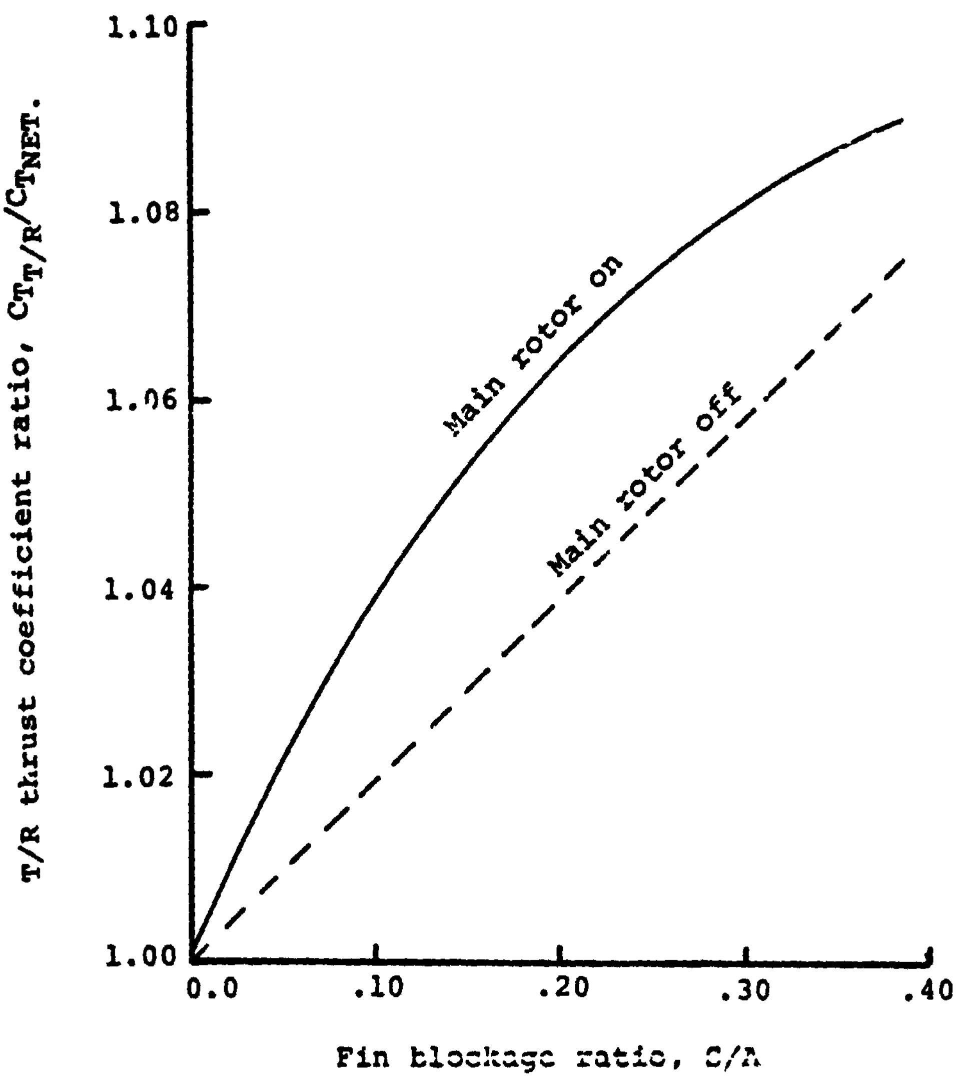
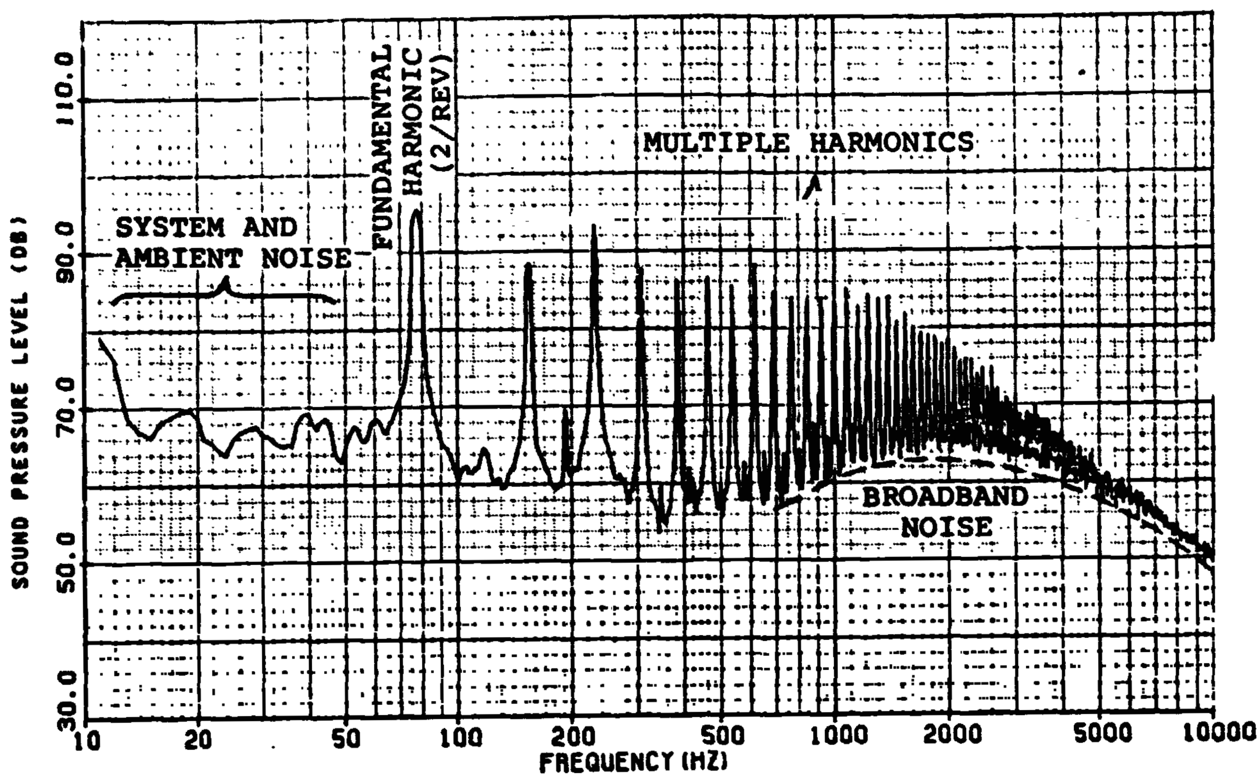
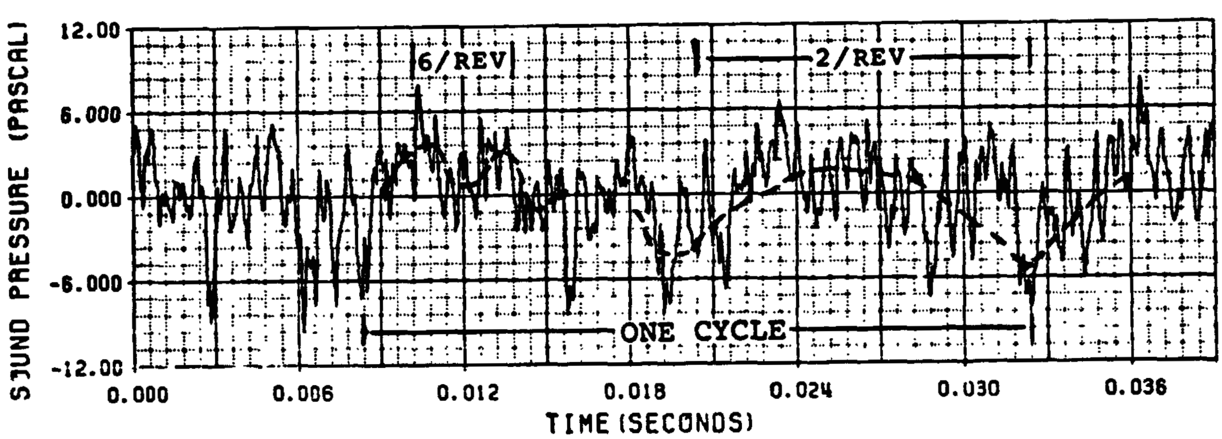


Figure 17. Effect of the main rotor on net tail rotor thrust of a pusher tail rotor versus fin blockage.

ORIGINAL PAGE IS
OF POOR QUALITY



a) Narrowband Analysis

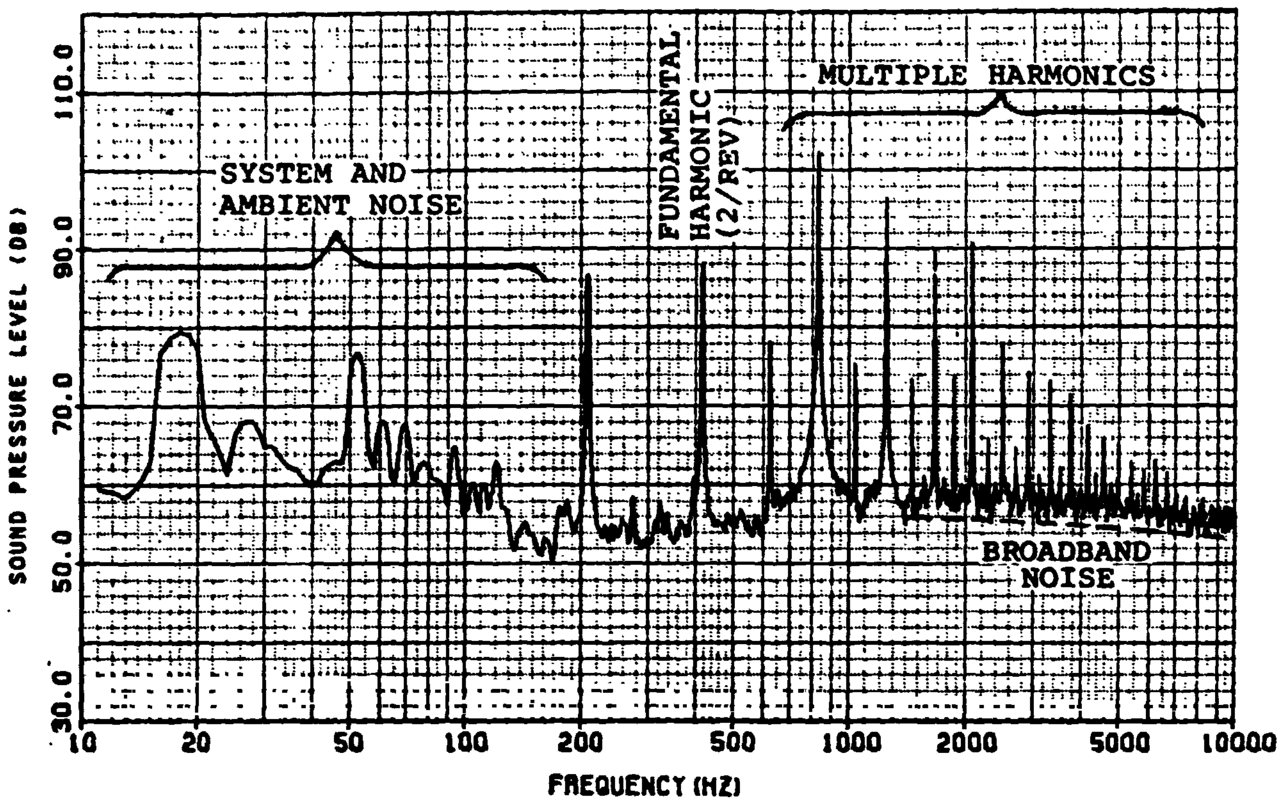


b) Time History

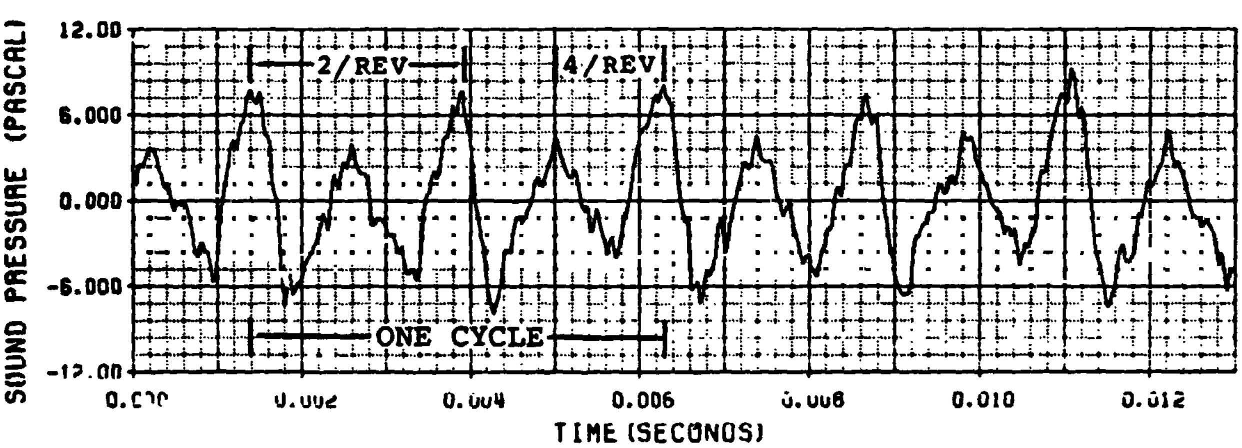
Figure 18. Sample acoustic spectra for the isolated main rotor.

RUN 84 CONF 12PF18 MR THRUST 780 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY



a) Narrowband Analysis



b) Time History

Figure 19. Sample acoustic spectra for a tractor tail rotor with fin, S/A = .39.

RUN 94 CONF T16TF39 TR THRUST 62 N MIKE 4

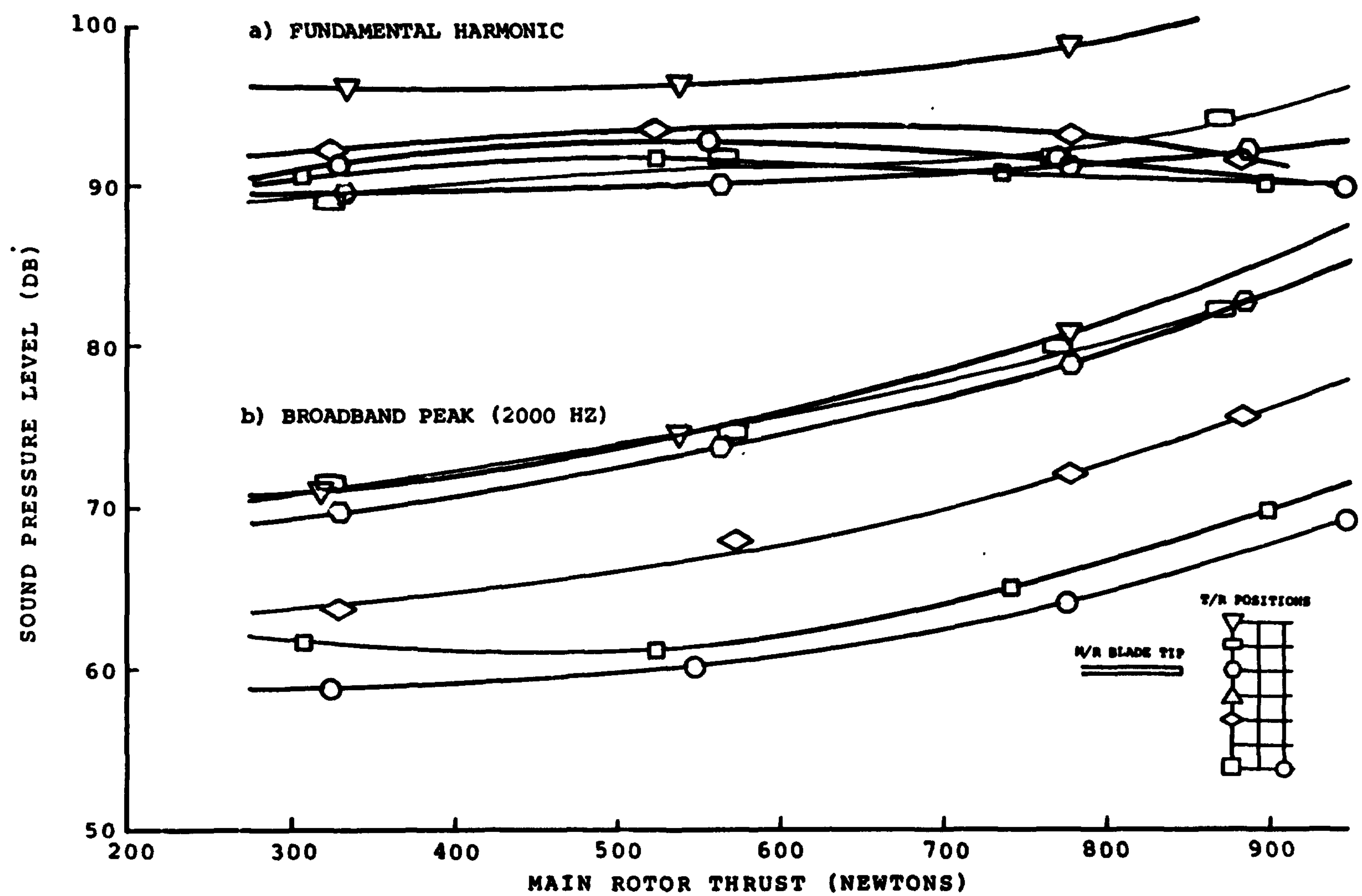


Figure 20. Effect of pusher tail rotor location on main rotor noise.

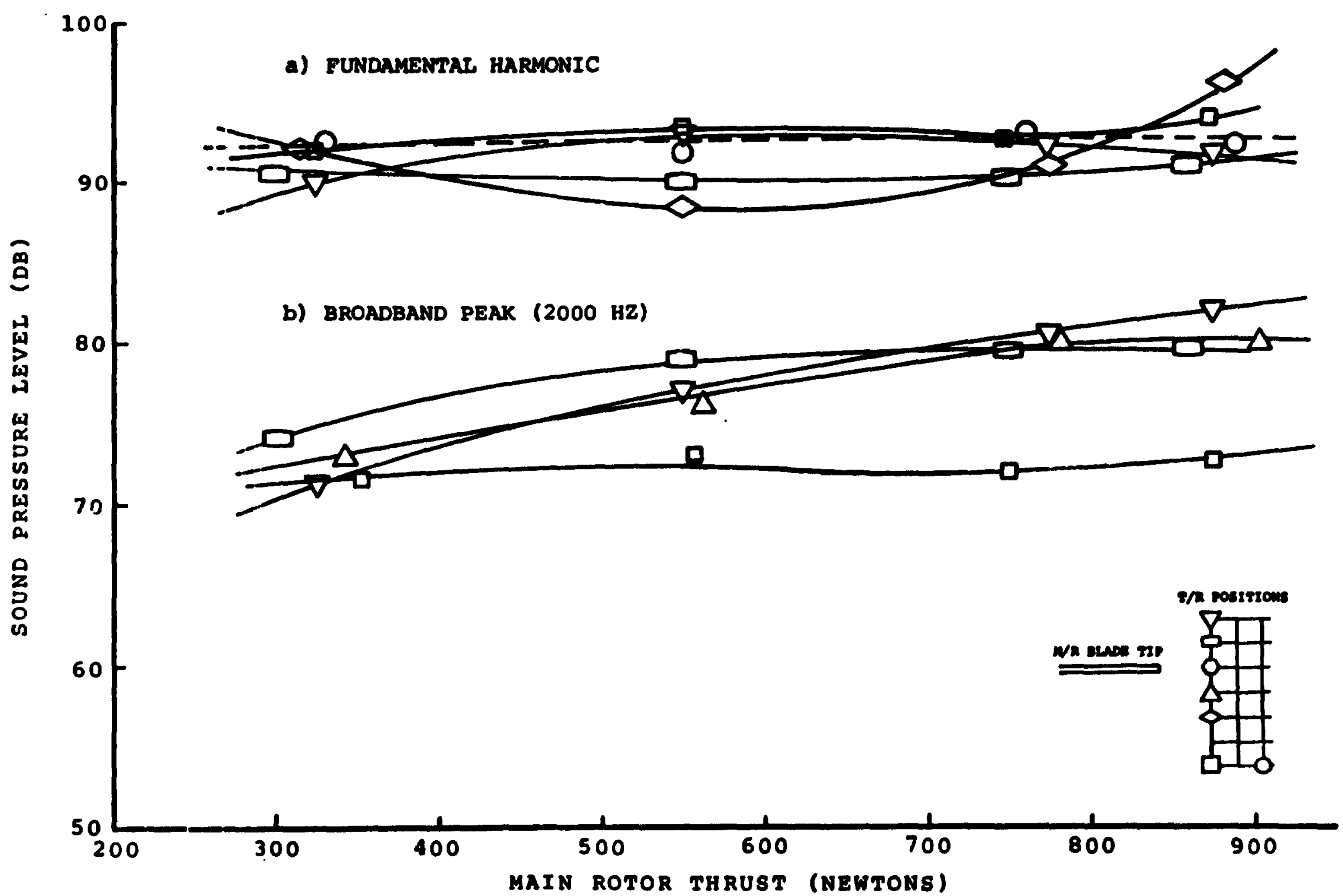


Figure 21. Effect of tractor tail rotor location on main rotor noise.

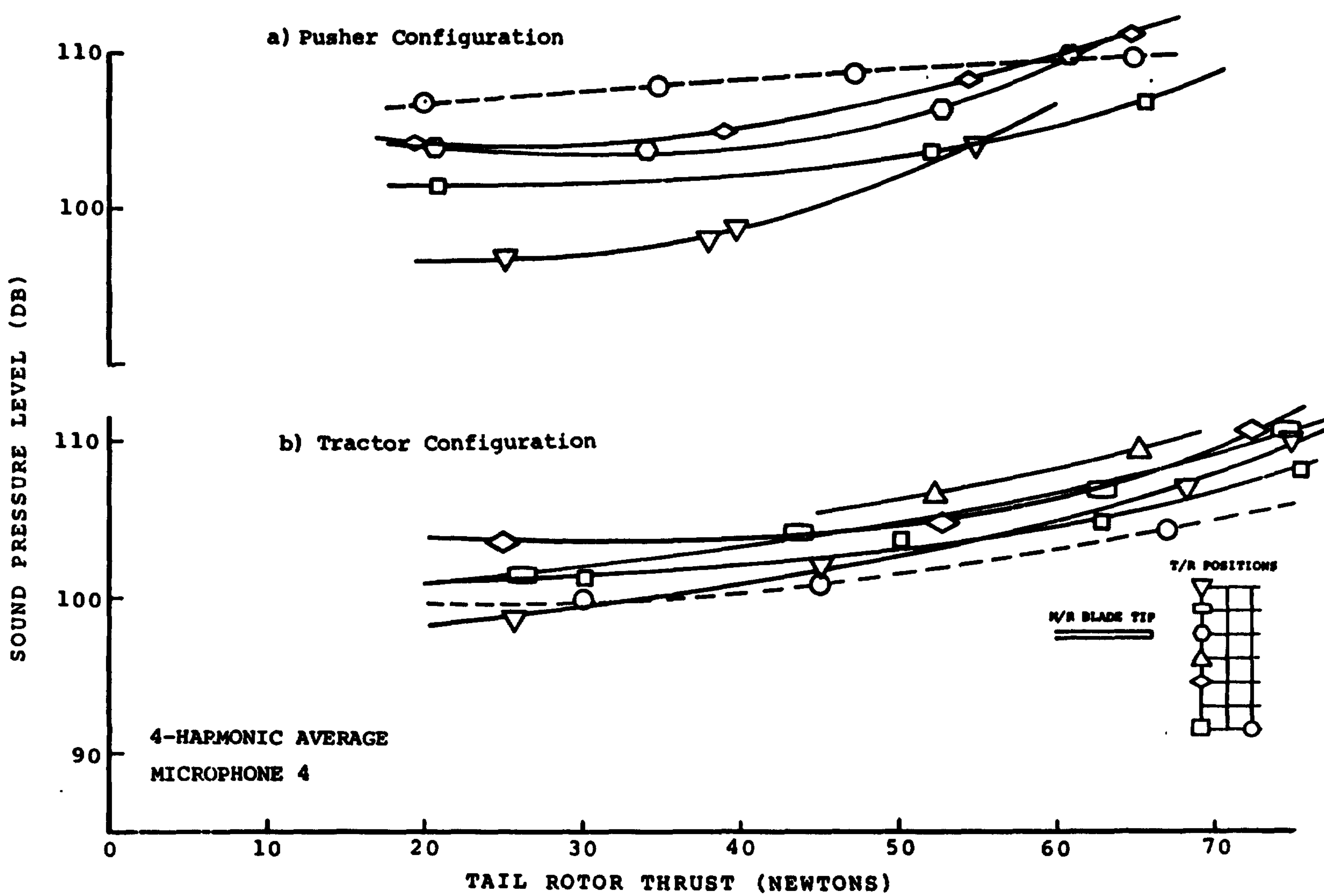
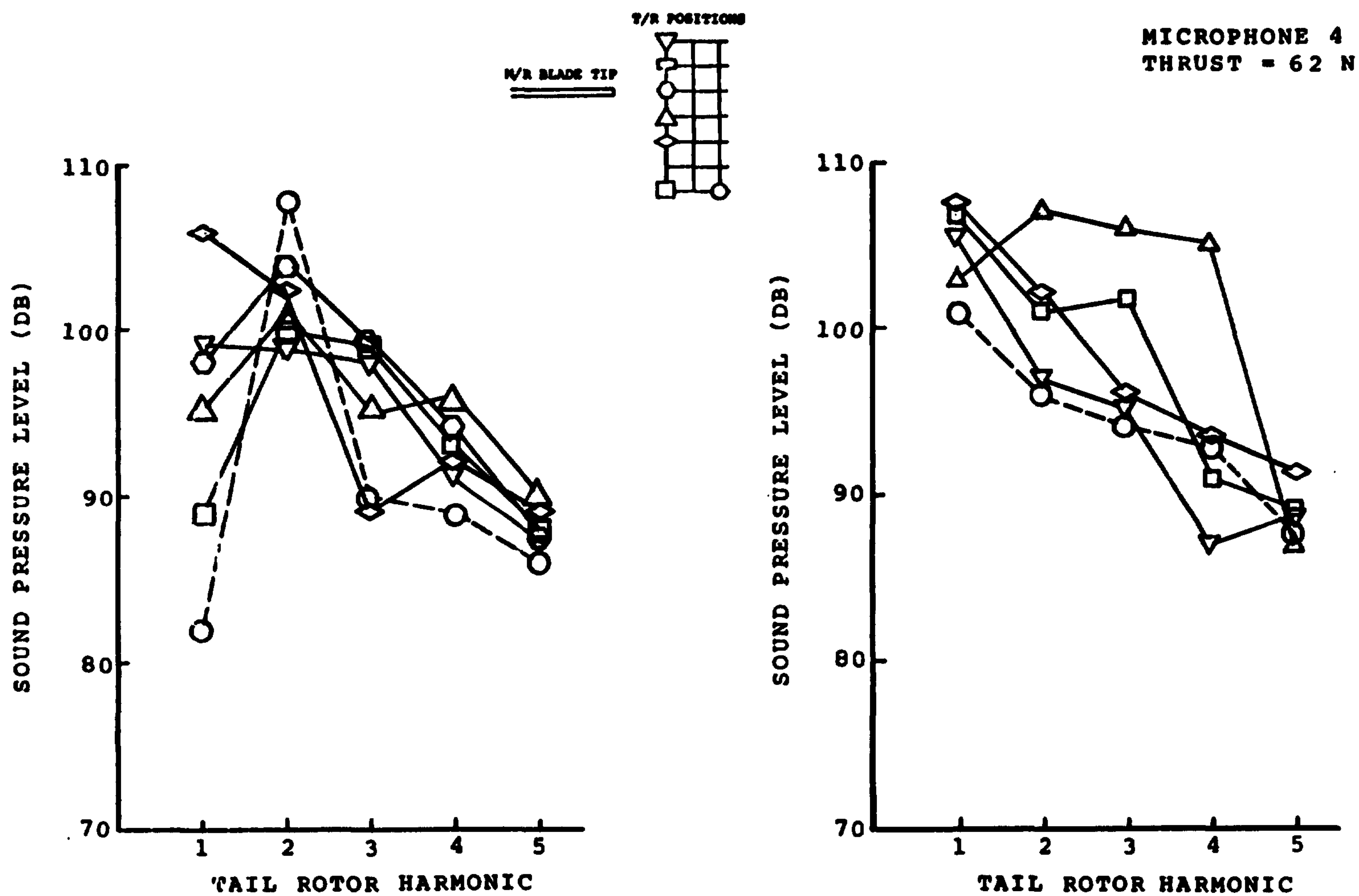


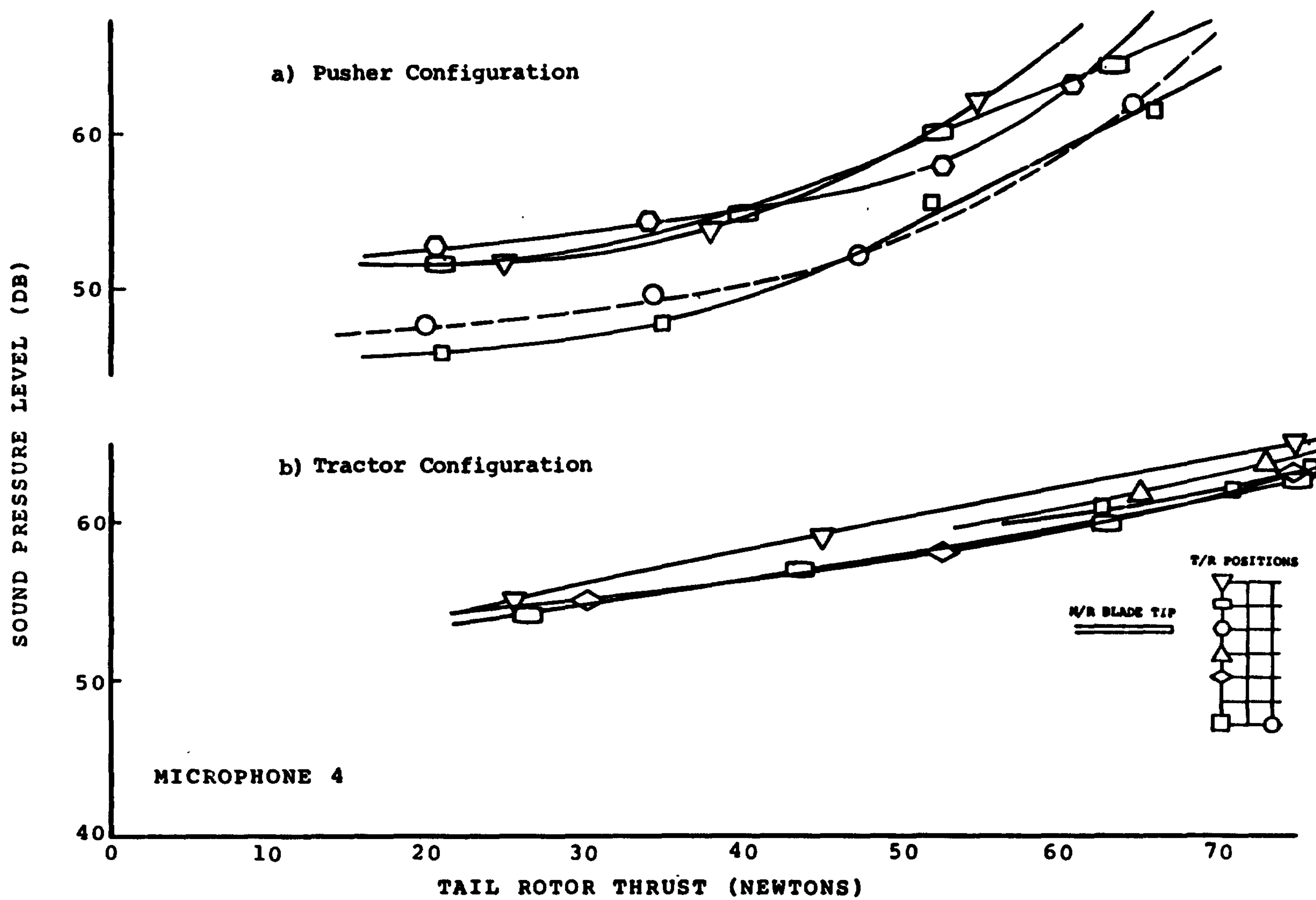
Figure 22. Variation in tail rotor harmonic noise with thrust and tail rotor location.



a) PUSHER CONFIGURATION

b) TRACTOR CONFIGURATION

Figure 23. Variation in tail rotor noise harmonics with tail rotor location.



ORIGINAL PAGE IS OF POOR QUALITY

Figure 24. Variation in tail rotor broadband noise (10000 Hz) with thrust and tail rotor location.

APPENDIX A

TEST EQUIPMENT

ORIGINAL PAGE IS OF POOR QUALITY

Model

The model represented a single (main) rotor helicopter with antitorque (tail) rotor. The model consisted basically of a main rotor, a tail rotor, a vertical fin, the respective rotor drive systems, rotor stands and base (see Fig. A-1). Both rotors and vertical fin were .151 scale of the Model 222. The 1.829m diameter main rotor was a two-bladed semi-rigid, teetering type. The .316m diameter tail rotor was a Locke Number scaled, stiff-in-plane, two-bladed teetering rotor with collective pitch. Basic data for the main rotor, tail rotor and vertical fin is summarized in Table A-I.

TABLE A-I. BASIC MODEL DATA

	MAIN ROTOR	TAIL ROTOR
Number of Blades	2	2
Radius, m	.9144	.1581
Disk area, m^2	2.627	.078
Blade chord (constant), m	.110	.038
Solidity	.076	.153
Blade twist (linear), rad	.178	0.0
Precone, rad	.061	0.0
Pitch/flap coupling, rad	.192	0.0
Flapping stops, rad	±.209	±.209
Direction of rotation	CCW looking down	Top blade aft
Rotor speed, rad/s	241.4	1306.7
Tip speed, m/s	220.8	206.5
Blade airfoil	FX080	NACA0012
	VERTICAL FIN	
Span, m	2.438	
Chord (average), m	.720	
Area, m^2	1.757	
Airfoil	15% Clark Y Modified (Cambered side to the right)	
Leading edge sweep angle, rad		
Upper	.529	
Lower	.926	
Incidence angle, rad	.026 Nose right	

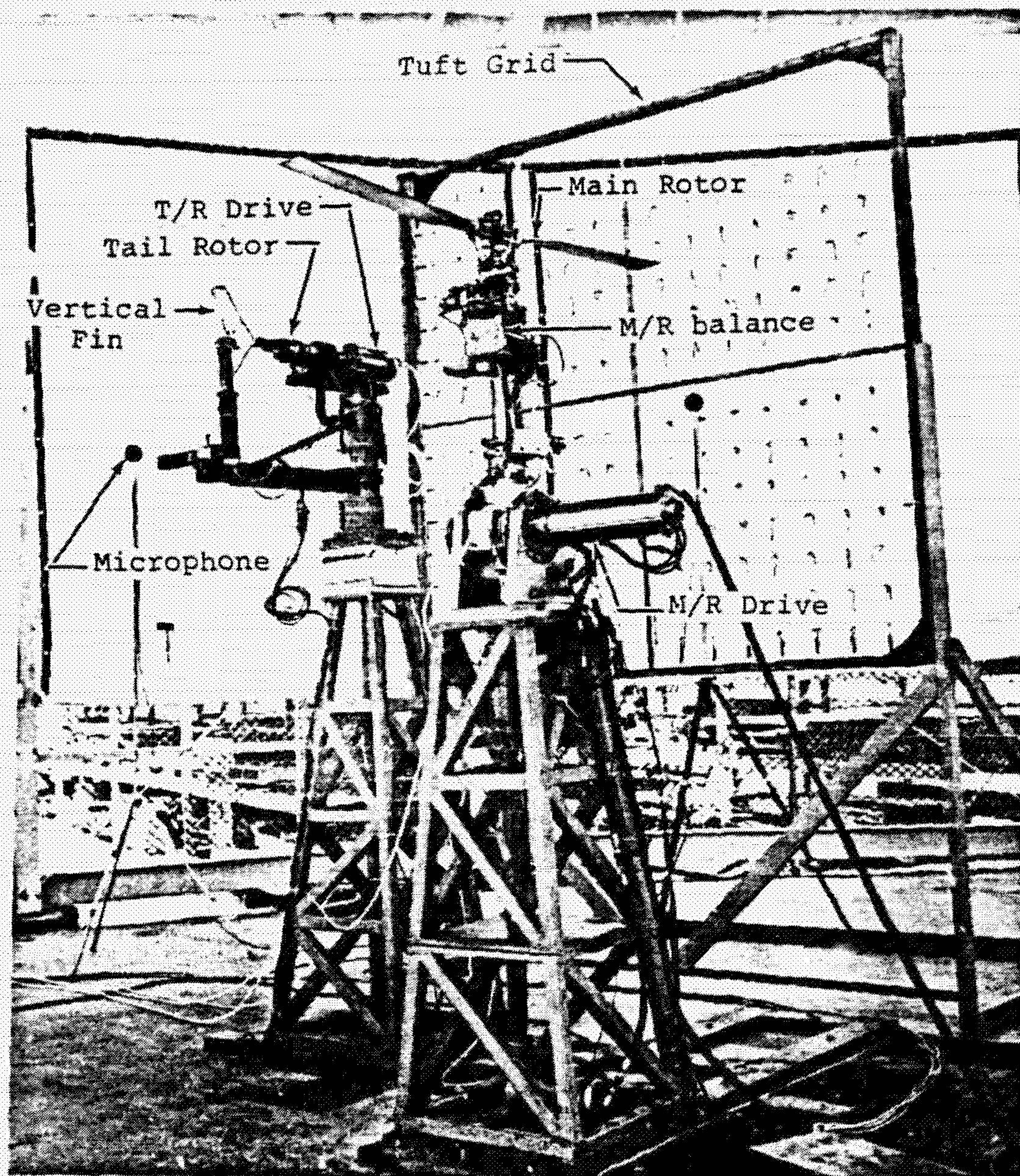


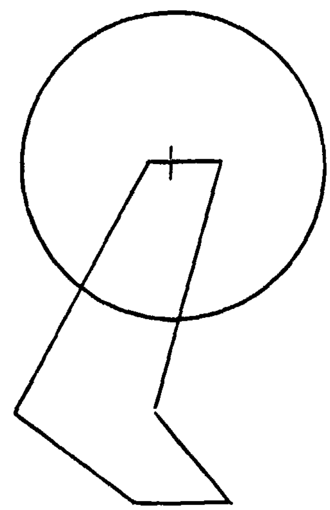
Figure A-1. Main rotor/tail rotor aerodynamic interaction test rig.

The main rotor was mounted on a drive system which included a 56 kw variable speed electric motor, a speed reducer, a tilting and yawing pylon assembly, rotor controls, and a five component rotor balance. The speed reducer output shaft drove the mast through a spline coupling and flexible disk coupling at the rotor balance. Main rotor fore and aft cyclic and collective were remotely controlled. Direct current motors were used for the control actuators. A collective control actuator was mounted above the rotor balance. The cyclic actuators rode on the slider assembly to provide fore-and-aft and lateral swashplate tilt. A forty slip ring assembly, used to carry signals from the rotating system, was located below the speed reducer gearbox. The tail rotor drive assembly consisted of an adjustable base assembly, an 11 kw variable speed electric motor, a drive shaft, a collective control mechanism and motorized collective actuator. The vertical fin support was attached to the tail rotor drive base assembly.

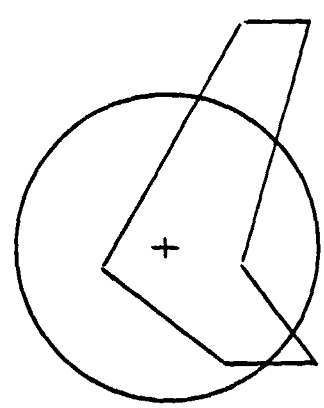
Both rotor drive systems were mounted atop stands to place the rotors out of ground effect. The resultant height to diameter ratio for the main rotor was 1.55. The stands were designed to slide on a base for lateral and longitudinal positioning of the rotors. Vertical positioning was obtained by use of shims under the tail rotor drive base. Canted tail rotor cases were simulated by tilting the main rotor mast and vertical fin through the required angle. Test stand changes from pusher to tractor tail rotor operation were made as follows: (1) the main rotor stand was moved to the opposite side of the "T" shaped base, (2) the tail rotor drive assembly was rotated 180 degrees, and (3) the tail rotor hub and blade assembly was inverted to maintain top blade aft orientation. The vertical fin was also turned around to maintain its fore-aft orientation. Relative positioning of the tail rotor and fin for the various test configurations is shown in Figures A-2 and A-3. Figure A-2 shows the two fin blockages used in the test. Figure A-3 shows the lateral separation of tail rotor and fin.

Test Facility

The model was situated in a 16m diameter covered whirl cage test facility (see Figure A-4). The cage consisted of a concrete floor, wire mesh walls, and a conical wooden roof 5.4m high at the wall and 3m high at the center. Canvas curtains were used to block outside winds. A 1.2m opening



(a) S/A=.18



(b) S/A = .39

Figure A-2. Fin blockage ratios used in test.

ORIGINAL PAGE IS
OF POOR QUALITY

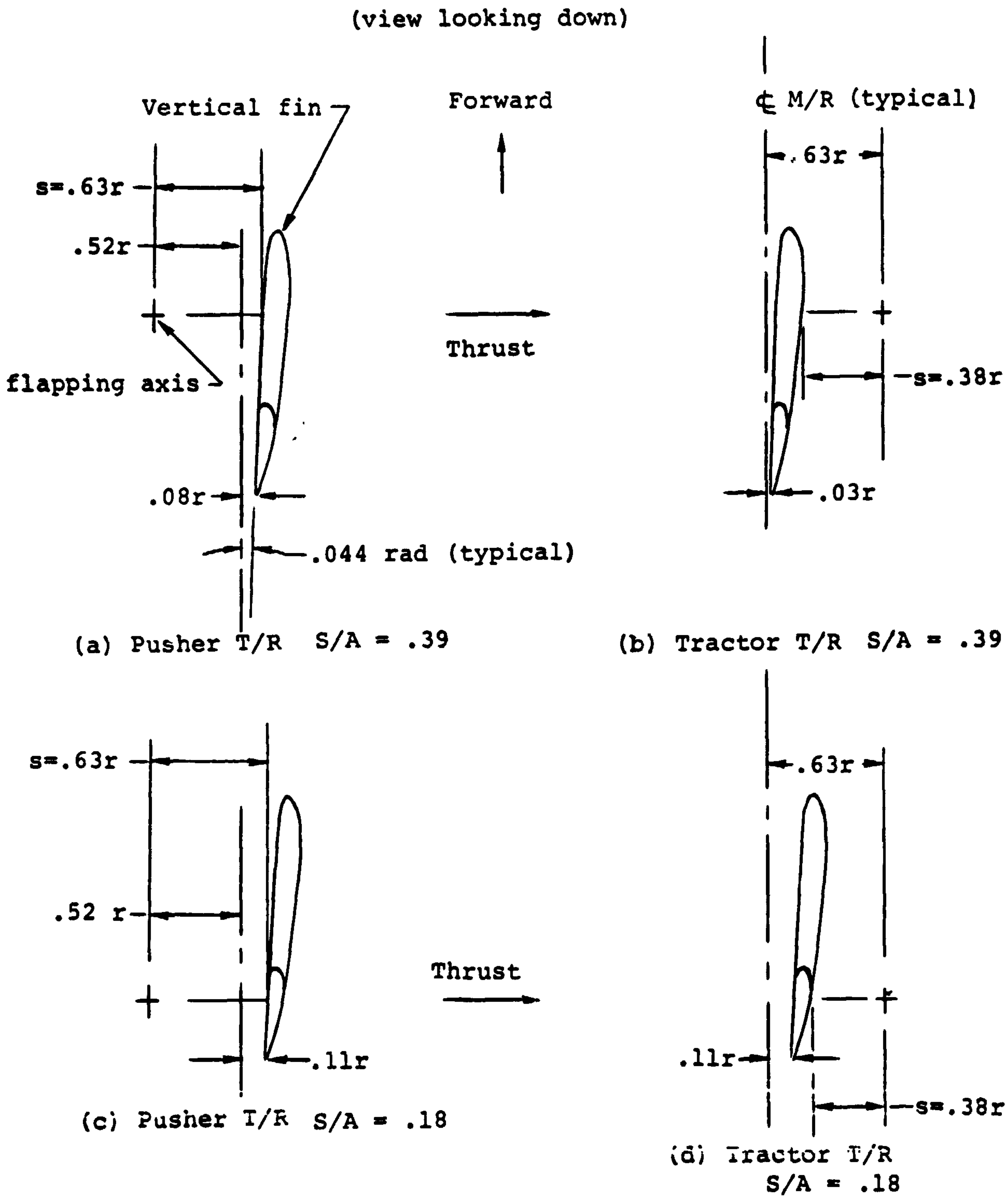
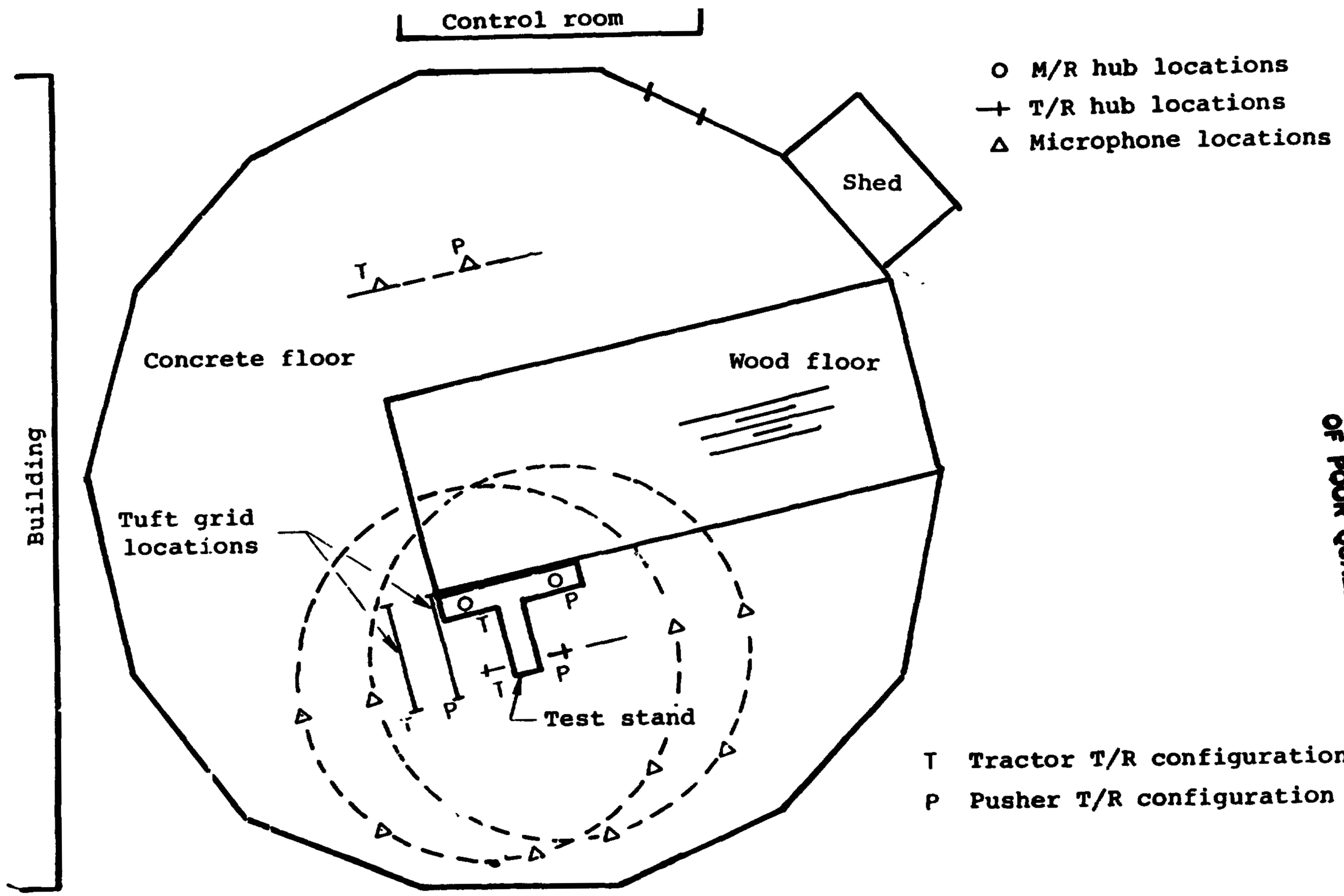


Figure A-3. Lateral separation of the tail rotor and vertical fin.



ORIGINAL PAGE IS OF POOR QUALITY

Figure A-4. Whirl cage floor plan.

was maintained above and below the curtains to avoid recirculation. Control inputs to the model were made from an operator's console located along with the data acquisition system in a building adjacent to the whirl cage.

A 2 meter by 3 meter wire mesh tufted grid was situated approximately 2m to the left of the tail rotor in order to show the tail rotor wake location and any main rotor recirculation. A closed circuit TV camera was placed approximately 2.4m behind the tail rotor.

Five microphones were located in a semicircle around the tail rotor at a radius of 3.35m and a height of 2.75m (in the plane of the main rotor). The same distance was maintained to the tail rotor whether in pusher or tractor mode (see Fig. A-4). A sixth microphone was placed 3.1m in front of the tail rotor at a height of 1.22m. These locations were chosen to minimize interference with moving the rotor test stand and yet maintain a maximum distance from any reflective surface. The reflective surfaces of the floor, roof, and walls were not treated and appeared to have no significant impact on the model data taken. Figure A-5 shows the microphone numbering system used for the test.

Model Instrumentation

The main rotor balance sensed thrust, H force, Y force, pitching moment and rolling moment through strain gaged flexures. Main rotor torque was sensed by strain gages on the mast. Main rotor cyclic and collective inputs were sensed with linear potentiometers. Flapping and feathering motions were sensed by rotary potentiometers. Rotational speed and azimuth position were sensed by a magnetic pickup. To monitor for safety, the main rotor hub and blades were strain gaged to sense pitch horn loads, hub beam and chord bending, and blade beam bending.

Tail rotor torque was measured as reacted drive motor torque. This torque was sensed by a strain gaged motor support member. Tail rotor thrust was sensed by an independent, side-mounted thrust balance with strain gaged flexures. Tail rotor collective input was sensed by a rotary potentiometer. Tail rotor rotational speed and azimuth position were sensed by magnetic pickup. Fin side force was sensed by a strain gaged load cell supporting the vertical fin.

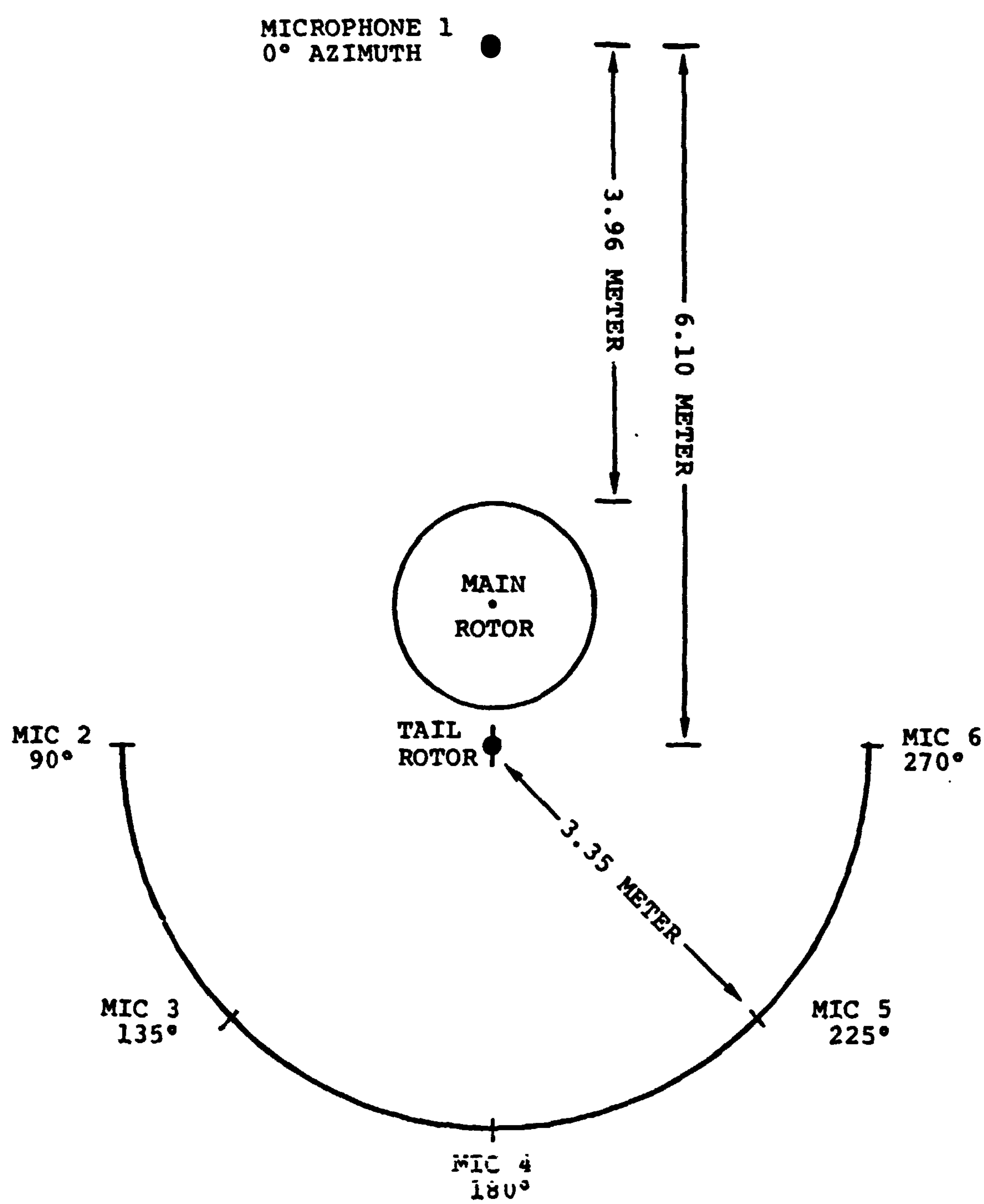


Figure A-5. Microphone identification.

ORIGINAL PAGE IS
OF POOR QUALITY

The accuracy of rotor thrust and torque measurements, with the one exception of tail rotor torque, was ±2% of full scale measured data. Computed increases in main rotor power due to aerodynamic interaction were accurate to ±1% due to the specialized test run procedure. That run procedure involved the following: (1) extensive warm-up and temperature stabilization, (2) consecutive records at each prime data point, (3) repeat of each prime data point during each run, and (4) conduct of a follow-on isolated main rotor thrust sweep for each run. Due to the low sensitivity of the tail rotor torque gage, accuracies for tail rotor power measurements could be verified to be no better than ±10%. However, tail rotor power measurement was demonstrated to be reasonably repeatable, and good correlation was obtained with test data of Reference 1 (see Figure 13).

Data Acquisition

Model Data - The data acquisition system provided on-line data reduction for those data items shown in Table A-II. The analog signals were filtered at 2 Hz to provide essentially steady-state data. Rotor speed pulses were converted to analog signals. These data items were then scanned sequentially at a rate of 1000 channels per second. At this rate, there were approximately 2 observations per main rotor revolution and 1 observation for every three tail rotor revolutions for each respective data item. The sample size for each time-averaged update was 25. The sample thus spanned approximately 12.5 main rotor revolutions and 67.5 tail rotor revolutions. The observations from the scanner were digitized by a digital voltmeter for input to the on-line computer. The computer was used to store the digitized data observations, adjust for zero tare, time average the sample, compute the five component balance interaction functions, and reduce the data to engineering units. This reduced data was continuously updated, displayed on a CRT and printed on a hardcopy during each test run. The computer also solved for tail rotor thrust required for yaw trim according to the following equation:

$$\text{Required } T_{T/R} = (Q_{M/R}/L) + F$$

This data was displayed to aid the operator in attaining a

ORIGINAL PAGE IS
OF POOR QUALITY

TABLE A-II. DATA ITEMS SCANNED AND REDUCED ON- LINE

Main Rotor	Tail Rotor	Vertical Fin
1. Thrust Force	1. Thrust	1. Side
2. H Force	2. Shaft Torque	
3. Y Force	3. Collective	
4. Pitching Moment	4. Rotor Speed	
5. Rolling Moment		
6. Shaft Torque		
7. Collective		
8. Rotor Speed		

TABLE A-III. DATA DISPLAYED AT OPERATOR'S CONSOLE

<u>Digital Analog Meters*</u>

Main Rotor - Thrust
Shaft Torque
Collective
Longitudinal Cyclic
Lateral Cyclic

Tail Rotor - Thrust
Shaft Torque
Collective

<u>Digital Displays</u>

Main rotor speed
Tail rotor speed

<u>CRT Displays</u>

Main Rotor - Hub beam vs. chord bending
Pitching moment vs. rolling moment
Pitch link load
Flapping

Tail Rotor - Shaft torque

* Indicates percent full scale

trimmed hover condition for the prime data points. A time code generator was used to give a unique record number and time of day for each prime data point. The operator's console was provided with various visual displays as shown in Table A-III.

Acoustics Data - The acoustics data acquisition system consisted of six microphones mounted on tripods, a six channel microphone amplifier, a time code generator, and a 14-track instrumentation tape recorder. Levels were monitored with a narrow band analyzer/oscilloscope and a digital voltmeter. The data acquisition system is shown in Figure A-6.

B&K 4131 one-half inch pressure response microphones on B&K preamplifiers with wind screens attached were used. The microphone diaphragms were kept parallel to the plane of the main rotor for flat frequency response. The signals were conditioned by a six channel microphone amplifier with 10 dB per step gain adjustments.

The microphone system was calibrated at the beginning and end of each tape reel and at the beginning and end of each day with a Pistonphone calibrator. This calibrator provides a 124 decibel RMS 250 Hertz tone. System frequency response was checked daily with a portable random noise generator.

Time code and record numbers were recorded along with the microphone signals on an Ampex FR-1300 14-track tape deck. The tape recorder used IRIG B intermediate band FM electronics and a tape speed of 30 inches per second, which gave a frequency response of DC to 10 KHz and a signal to noise ratio of 46 dB RMS. The same record numbers and time-of-day were used as for the model data acquisition system. A prime data signal was used to show valid data for each record. The time code, based on hours, minutes and seconds, were in IRIG B format. Additional code bits were used to provide record numbers and indicate prime data.

All of the components of the system were calibrated and tested prior to setup by the BHT Standards and Calibration Laboratory, providing traceability to the National Bureau of Standards. The system frequency response of one channel of the system, not including the microphone, is shown in Figure

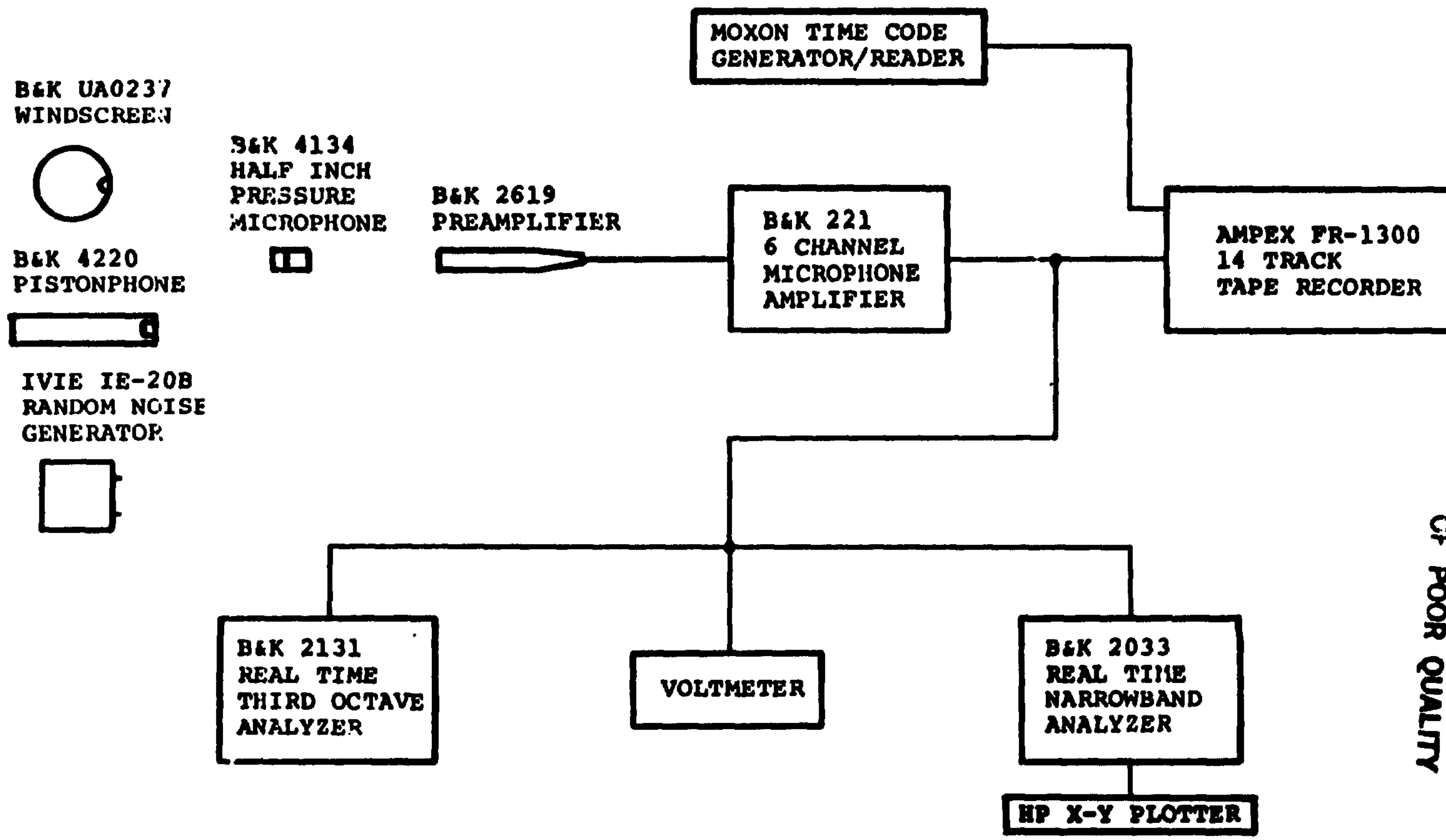


Figure A-6. Acoustics data acquisition system.

A-7. The combined ambient background noise and the tape recorder noise floor is shown in Figure A-8 for an intermediate gain setting. None of the test data taken was affected by either the system frequency response or the recorder noise floor. The system frequency response did cause loss of data above 10 KHz and the recorder noise floor dominated the spectrum below 80 Hz, but these regions were not of interest during this test.

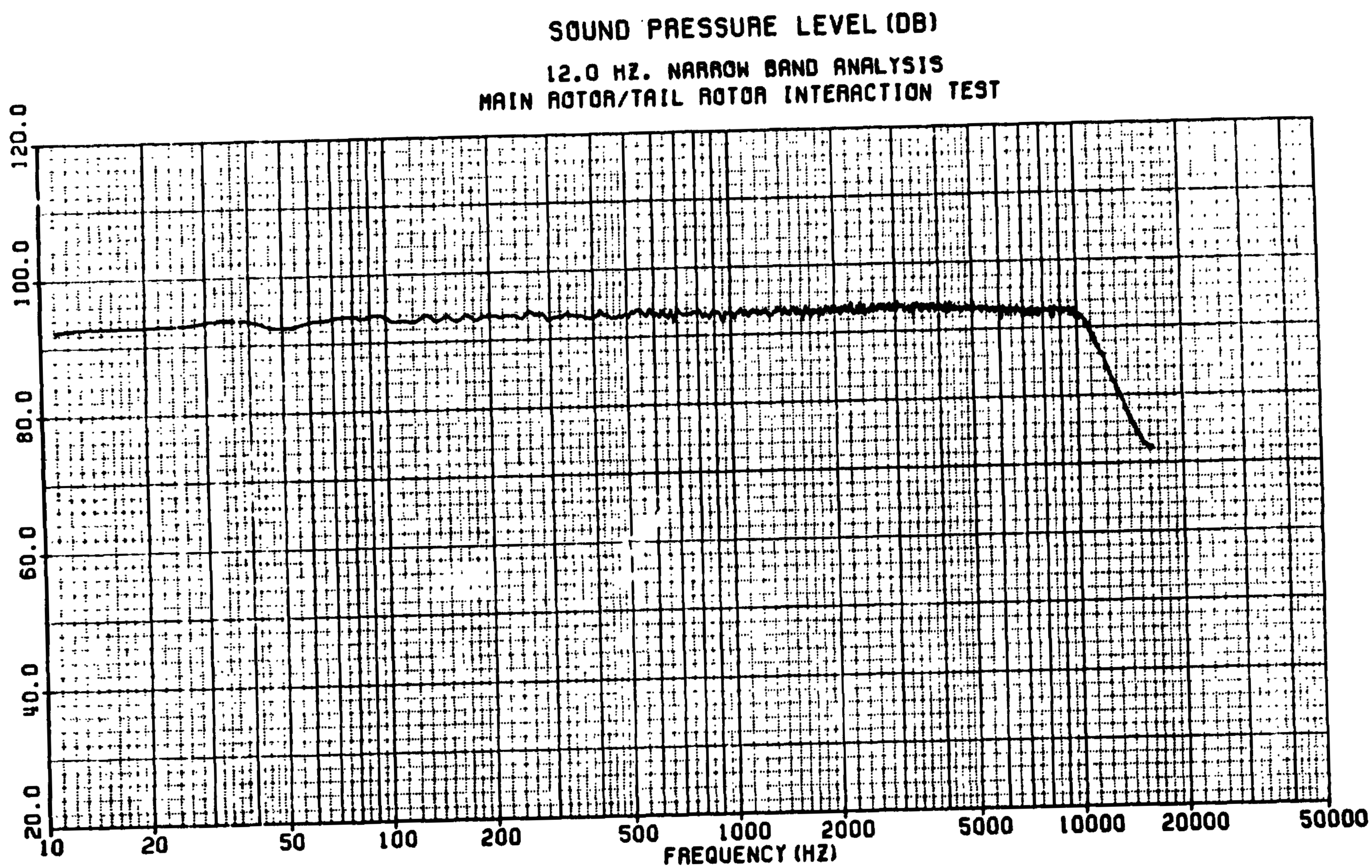


Figure A-7. White noise frequency response.

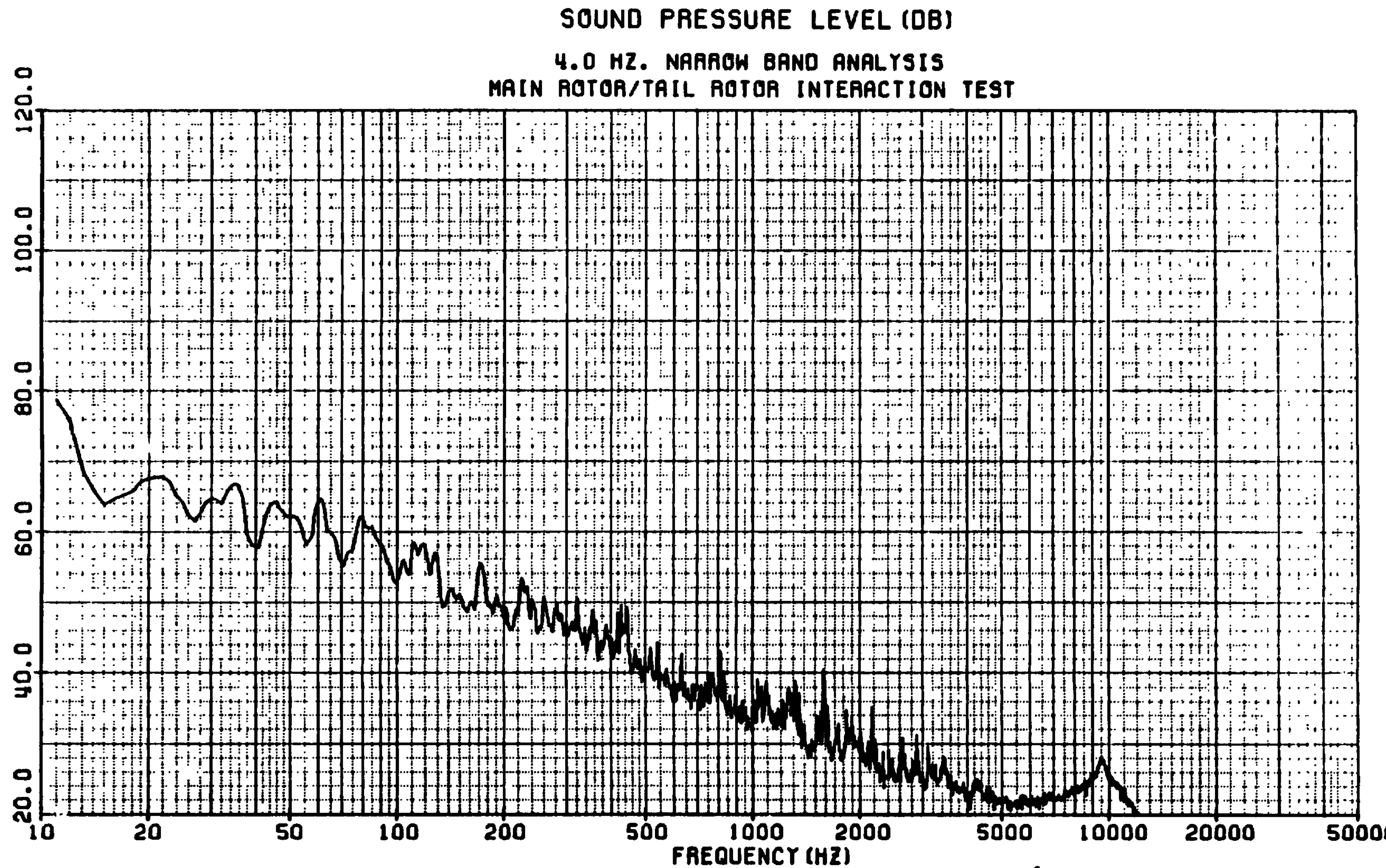


Figure A-8. Combined ambient background noise/system noise floor.

TEST PROCEDURE

The test was conducted in a series of 110 separate test runs over a period of two months. The individual test runs were distinguished by defining the following parameters: 1) operating mode, 2) tail rotor location, 3) Pusher versus tractor tail rotor, 4) cant of tail rotor, 5) fin blockage ratio. The configuration code developed to specify these parameters is shown in Figure A-9. Data was recorded for three operating modes: 1) isolated main rotor, 2) isolated tail rotor, and 3) interaction, i.e., both rotors operating.

Identification numbers defining the tail rotor location matrix are shown in Figure A-10. The initial grid of tail rotor locations established for this test consisted of grid point numbers 1 through 12 shown in Figure A-10. Spacing between the initial grid points was in increments of 1.0r. This grid was explored starting with the tail rotor locations nearest the main rotor and proceeding to the more remote tail rotor locations. This exploration continued for each row to the point at which main rotor power was unaffected by operation of the tail rotor. Within this established boundary, a number of intermediate grid points at .5r increments were added. Data for grid points 5 and 9 through 12 has been omitted from this report due to equipment problems which occurred during those test runs. Based on the results obtained from the remainder of the test, it is believed that these grid points are outside the boundary of tail rotor locations that produce significant interaction in hover. A summary of the valid test runs is given in Table B-I.

The following run procedure was developed to demonstrate repeatability and to compensate for thermal effects on the main rotor thrust measurement:

1) Ambient conditions (Outside air temperature, barometric pressure, wind velocity) measured and recorded.

2) Warm-up Run - Both rotors at operating speed and elevated load.

3) Initial static zero - Rotors stopped.

4) Stabilization Period - Both rotors at operating speed and elevated load

5) Interaction Data - Trim at approximately 4 main rotor thrust levels. Set main rotor collective to obtain desired thrust. Adjust tail rotor collective to obtain required antitorque. (Where required anti-torque was in excess of the tail rotor maximum thrust capability, the tail rotor was operated at maximum collective of .38 radians). Take two consecutive prime data records. Repeat trim points.

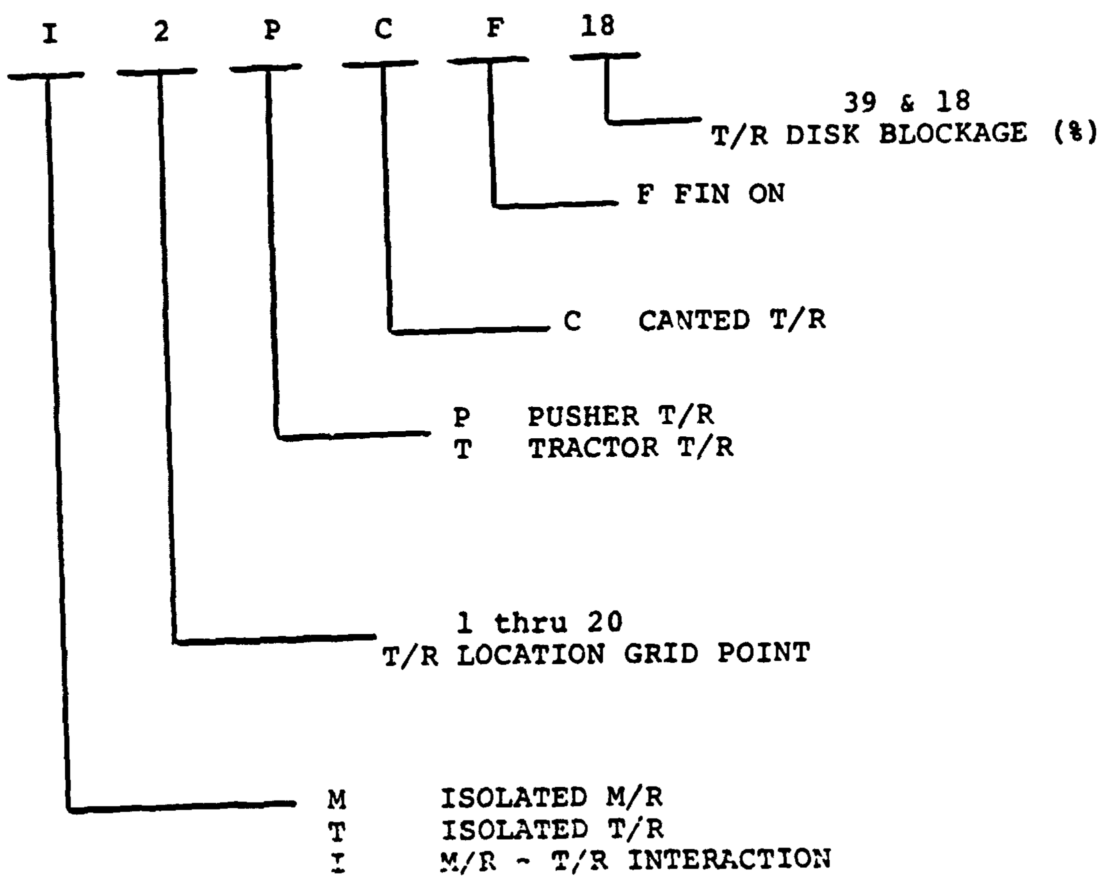


Figure A-9. Test configuration code.

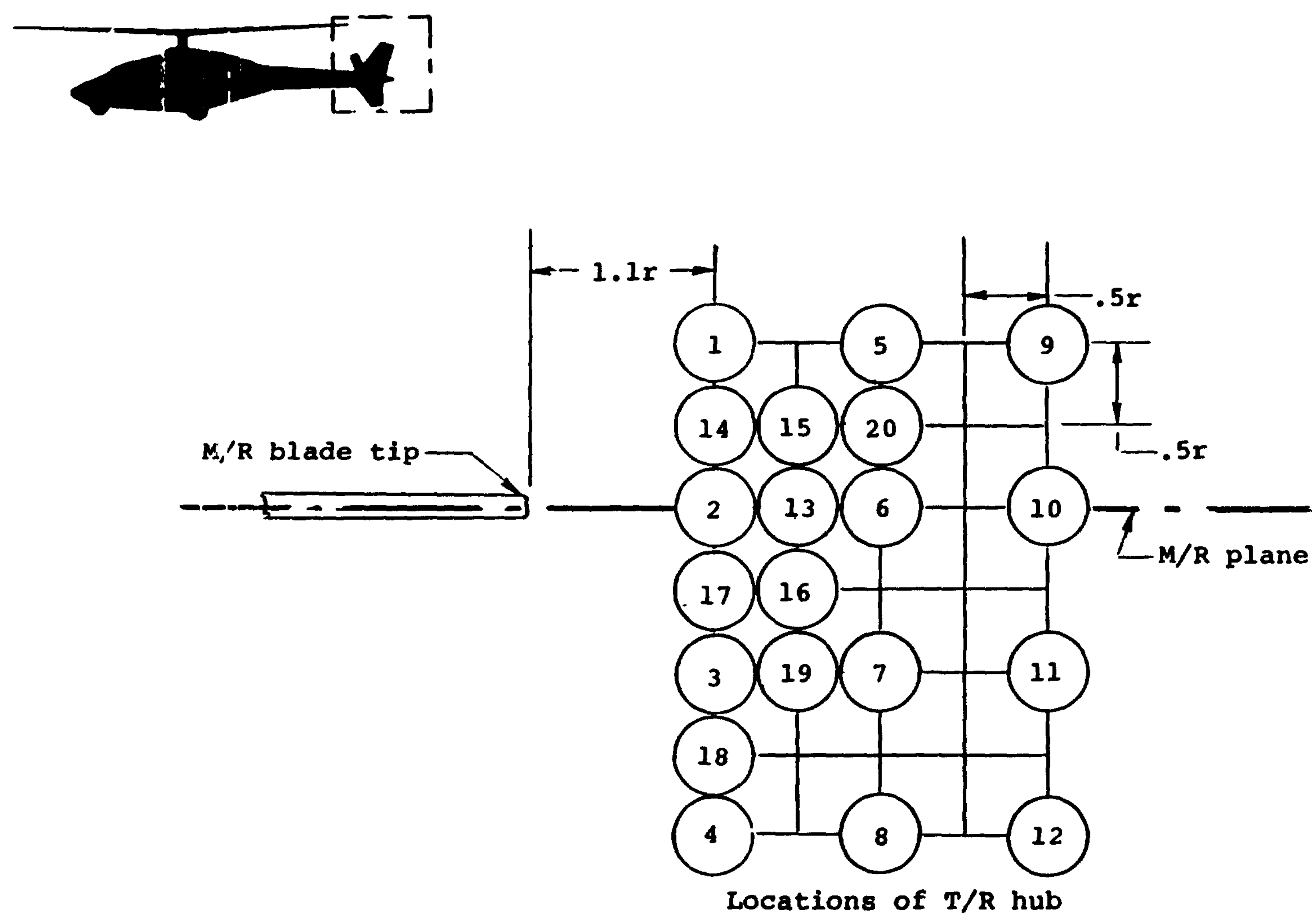


Figure A-10. Grid point identification for tail rotor locations tested.

6) Isolated Main Rotor Data - Tail rotor stopped. Take prime data record at approximately 4 main rotor thrust levels. Repeat 4 thrust levels.

7) Final static zero - Rotors stopped.

As mentioned before, openings below and above the canvas curtains covering the walls of the whirl cage were maintained to avoid recirculation of rotor wake. Because of these openings to the outside, wind velocity was measured at the model prior to start-up of each test run. Runs were conducted only if maximum winds were less than 1.5m/sec. The procedure of taking two consecutive records for each prime data point and repeating this trim condition within each test run (resulting in four records for each trim condition for a given run) helped minimize the effects of any wind gusts occurring during a test run.

The four main rotor thrust levels comprising the thrust sweeps were, in terms of C_T, .0021, .0035, .0050, and .0064. In some instances, the antitorque requirement for trim exceeded maximum tail rotor thrust capability. In these cases, tail rotor collective was set to maximum and the record was taken in this untrimmed condition.

DATA REDUCTION

Aerodynamic Performance Data

Due to low frequency filtering and sample averaging as discussed previously, the values for prime data presented in Appendix B are believed to fairly represent steady state conditions. An adjustment was made to the original recorded data to account for any difference between initial and final static zero values as measured for each run. Curve fits of power coefficient, C_p versus thrust coefficient, C_T for both rotors were obtained by a regression technique and based on an equation of the general form:

$$C_p = a_o + a_1 C_T^{3/2}$$

This model was based on the theoretical relationship of induced power in hover to thrust. (Equation 34 of Ref.6). Profile power contributions were considered secondary in effect and not included in the model. Tail rotor data exhibited an abrupt change in the C_p versus C_T relationship at the onset of rotor stall. For this reason, where sufficient data was available, two separate curve fits were applied to the tail rotor data, one below and one above the stall break.

Acoustics Data

After a first look at the data using a real-time narrowband analyzer, representative prime data records were processed for high speed digitizing and copying onto digital tapes for further analysis. All data were digitized at a rate of 32768 samples per second to ensure high resolution and to place the Nyquest frequency well above the highest frequency of interest.

The digitized data were subsequently processed through a time history plot program and a spectrum analysis program. Corrections for reference calibration level and amplifier gain were automatically made in each computer program. Since the system frequency response consistenly appeared within tolerance, no adjustments for frequency response were applied to the data.

Time histories are plotted for approximately 1.5 revolutions of the main rotor (39 milliseconds per plot) for isolated main rotor and for approximately 2.5 revolutions of the tail rotor (13 milliseconds per plot) for isolated tail rotor cases. This analysis allows determination of peak amplitudes and reveals any distinct characteristics of the

waveform.

The spectrum analysis program uses the Fast Fourier Transform (FFT) technique to reduce data. Blocks of 32768 samples are first processed to provide a frequency spectrum analysis with a one Hertz resolution. The resulting frequency coefficients are then smoothed using a four hertz sweeping filter. Each contiguous block is then ensemble averaged for the length of the prime data record to give statistically valid data and plotted on a log frequency scale. Each record presented in this report was averaged for twelve seconds. The frequency analysis technique allows identification of noise-producing components, determination of what source actually dominates the noise, and reveals the relative contribution of harmonic and broadband noise.

APPENDIX B

TABULATED TEST DATA

This appendix is a tabulation of measured performance data. All data is shown in SI units. The tables are ordered by test run number. The test configuration for each run is indicated by the configuration code in the table heading. An explanation of the code is presented in Figure A-9. Tail rotor locations are defined by grid point as shown on Figure A-10. A summary of all test runs included is shown in Table B-I. For test runs including both main and tail rotor operation, a table of main rotor data is presented first, followed by a table of tail rotor data. The MODE item shown for main rotor data is defined as follows:

INTERACTION - Both main and tail rotors operating.

*ISOLATED - Main rotor only operating; tail rotor stopped.
* Included at the end of each Interaction run.

T/R @ FLAT PITCH - Main rotor operating at low thrust; tail rotor operating at zero thrust.

Within each table the entries are arranged by prime data record number. At each prime data "trim" point, two consecutive records were recorded as a check on repeatability of the time averaged data. These consecutive "repeat" records are denoted by the suffixes A and B on the record numbers.

Rotor collective setting THETA applies to 3/4 radius setting for the twisted main rotor blade. Fin force is positive in the opposite sense of positive tail rotor thrust. Fin and net tail rotor thrust coefficients are defined as follows:

$$C_{T_{FIN}} = F/A_{T/R}\rho(\omega r)^2$$

$$C_{T_{NET}} = C_{T_{NET}} \text{ ACTUAL} = (T_{T/R}-F)/A_{T/R}\rho(\omega r)^2$$

$$C_{T_{NET}} \text{ REQUIRED} = (Q_{M/R}/L)/A_{T/R}\rho(\omega r)^2$$

TABLE B-I. SUMMARY OF TEST RUNS

Run Number	Configuration	Run Number	Configuration
30	T6P	86	I2TF18
49	T2PF18	87	T2TF18
52	T2PF18	88	I2TCF18
54	T3PF39	89	T2TCF18
64	I8PF39	90	I2T
65	I8P	91	I13TF18
66	I4P	92	I6TF18
67	I4PF39	93	I16TF39
68	I3PF39	94	T16TF39
69	I3P	95	I19TF39
70	I7PF39	96	I7TF39
71	I6PF18	97	I3TF39
73	I13PF18	98	I3T
74	I1PF18	99	I18TF39
75	I2PCF18	100	I4TF39
76	I14PF18	101	I8TF39
77	I15PF18	102	I17TF39
78	I16PF18	103	T17TF39
79	I17PF18	104	I17TF18
80	T17PCF18	105	T17TF18
81	I17PF39	106	I14TF18
82	I18PF39	107	I15TF18
83	I19PF39	108	I20TF18
84	I2PF18	109	I1TF18
85	I2P	110	T1T

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 30 CONFIGURATION T6P ARM= 1.246 M
AIR DENSITY RATIO 0.9990 OAT 15.0 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET
410A	18.2	0.469	1307.3	.004430	.0007221	0.161	0.0	0.000000	.004430
410B	17.9	0.464	1307.7	.004362	.0007147	0.160	0.0	0.000000	.004362
411A	36.3	0.919	1308.1	.008828	.0014130	0.241	0.0	0.000000	.008828
411B	36.3	0.917	1308.2	.008838	.0014110	0.241	0.0	0.000000	.008838
412A	45.7	1.251	1307.0	.011129	.0019271	0.281	0.0	0.000000	.011129
412B	45.2	1.244	1308.7	.010982	.0019117	0.281	0.0	0.000000	.010982
413A	49.0	1.448	1307.2	.011938	.0022310	0.304	0.0	0.000000	.011938
413B	49.8	1.469	1307.6	.012114	.0022609	0.303	0.0	0.000000	.012114
414A	54.8	1.817	1308.2	.013336	.0027943	0.328	0.0	0.000000	.013338
414B	54.9	1.829	1308.5	.013342	.0028120	0.328	0.0	0.000000	.013342
415A	58.5	2.161	1306.8	.014254	.0033312	0.348	0.0	0.000000	.014254
415B	58.5	2.141	1306.2	.014268	.0033031	0.347	0.0	0.000000	.014268
416A	62.2	2.548	1308.8	.015108	.0039148	0.369	0.0	0.000000	.015108
416B	62.9	2.568	1308.2	.015296	.0039499	0.369	0.0	0.000000	.015296
417A	54.1	1.786	1307.1	.013175	.0027518	0.323	0.0	0.000000	.013175
417B	54.6	1.778	1307.6	.013283	.0027374	0.322	0.0	0.000000	.013283
418A	44.6	1.213	1307.4	.010851	.0018684	0.273	0.0	0.000000	.010851
418B	44.8	1.209	1307.5	.010914	.0018612	0.273	0.0	0.000000	.010914
419A	36.3	0.919	1307.7	.008822	.0014137	0.241	0.0	0.000000	.008822
419B	35.8	0.915	1307.7	.008703	.0014085	0.240	0.0	0.000000	.008703
420A	18.2	0.458	1307.2	.004431	.0007048	0.162	0.0	0.000000	.004431
420B	17.6	0.458	1307.2	.004290	.0007048	0.162	0.0	0.000000	.004290

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 49 CONFIGURATION T2PF18 ARM= 1.088 M
AIR DENSITY RATIO 0.9959 OAT 18.3 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET
655A	65.3	2.788	1306.4	.015962	.0043138	0.368	2.4	0.000577	.015385
655B	64.9	2.778	1306.0	.015885	.0043009	0.367	2.4	0.000599	.015286
656A	17.0	0.496	1305.5	.004162	.0007683	0.151	0.7	0.000174	.003987
656B	17.1	0.493	1305.2	.004196	.0007634	0.151	0.6	0.000153	.004044
657A	35.9	0.940	1305.8	.008789	.0014557	0.232	1.4	0.000349	.008441
657B	36.3	0.931	1305.1	.008885	.0014430	0.232	1.3	0.000316	.008569
658A	44.5	1.210	1305.2	.010900	.0018753	0.264	1.6	0.000381	.010518
658B	44.4	1.193	1305.2	.010889	.0018490	0.263	1.5	0.000371	.010518
659A	48.8	1.409	1306.0	.011955	.0021810	0.289	1.6	0.000381	.011573
659B	48.8	1.408	1305.1	.011970	.0021821	0.288	1.7	0.000425	.011545
660A	53.2	1.788	1306.6	.013009	.0027660	0.320	2.0	0.000479	.012530
660B	53.3	1.804	1304.7	.013068	.0027986	0.320	1.9	0.000469	.012599
661A	58.2	2.185	1304.3	.014288	.0033913	0.340	2.2	0.000535	.013754
661B	57.8	2.164	1304.5	.014175	.0033569	0.340	2.3	0.000557	.013618
662A	64.0	2.704	1306.5	.015644	.0041821	0.370	2.7	0.000653	.014991
662B	64.5	2.740	1304.2	.015841	.0042530	0.369	2.6	0.000644	.015197
663A	52.5	1.696	1307.3	.012831	.0026198	0.306	1.9	0.000456	.012375
663B	53.2	1.698	1306.7	.013018	.0026258	0.305	1.9	0.000457	.012561
664A	44.3	1.184	1305.5	.010862	.0018342	0.265	1.6	0.000392	.010470
664B	44.5	1.199	[illegible]	.010898	.0018575	0.265	1.5	0.000371	.010527
665A	35.1	0.878	[illegible]	.008603	.0013592	0.229	1.2	0.000305	.008298
665B	34.8	0.882	[illegible]	.008513	.0013640	0.229	1.3	0.000326	.008186
666A	17.3	0.442	1306.1	.004224	.0006838	0.153	0.8	0.000185	.004039
666B	17.4	0.446	1306.1	.004267	.0006908	0.153	0.7	0.000174	.004093

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 52 CONFIGURATION T2PF18 ARM= 1.088 M
AIR DENSITY RATIO 0.9774 OAT 23.3 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET
699A	17.0	0.489	1304.6	.004247	.0007733	0.122	0.3	0.000067	.004180
699B	16.5	0.485	1304.6	.004135	.0007661	0.122	0.3	0.000067	.004069
700A	35.3	0.916	1304.4	.008830	.0014488	0.210	0.8	0.000211	.008618
700B	34.4	0.909	1304.6	.008604	.0014376	0.210	0.8	0.000211	.008393
701A	44.4	1.226	1305.4	.011080	.0019352	0.248	1.3	0.000322	.010758
701B	44.2	1.218	1305.2	.011039	.0019233	0.248	1.0	0.000255	.010784
702A	55.6	1.936	1305.3	.013880	.0030575	0.294	1.5	0.000366	.013514
702B	54.8	1.959	1306.1	.013654	.0030897	0.294	1.3	0.000333	.013321
703A	67.6	3.031	1306.9	.016838	.0047746	0.354	2.2	0.000543	.016295
703B	67.5	3.004	1306.6	.016813	.0047341	0.353	2.4	0.000587	.016225
704A	52.4	1.716	1307.2	.013054	.0027019	0.288	1.6	0.000388	.012667
704B	52.6	1.738	1306.4	.013149	.0027392	0.288	1.6	0.000410	.012738
705A	44.5	1.199	1305.3	.011104	.0018927	0.238	1.2	0.000311	.010793
705B	43.9	1.174	1305.8	.010942	.0018522	0.238	1.2	0.000300	.010642
706A	37.1	0.947	1305.2	.009262	.0014951	0.207	0.8	0.000211	.009051
706B	36.5	0.941	1305.4	.009115	.0014857	0.207	1.1	0.000266	.008849
707A	16.6	0.442	1305.3	.004153	.0006975	0.107	0.6	0.000144	.004009
707B	16.7	0.453	1306.2	.004170	.0007144	0.107	0.6	0.000155	.004015
708A	66.1	2.858	1306.1	.016494	.0045081	0.354	2.1	0.000532	.015961
708B	64.4	2.800	1307.6	.016022	.0044048	0.354	2.4	0.000586	.015436
709A	18.1	0.465	1305.2	.004531	.0007351	0.114	0.4	0.000089	.004442
709B	17.9	0.466	1305.9	.004471	.0007379	0.114	0.6	0.000144	.004327

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 54 CONFIGURATION T3PF39 ARM= 1.088 M
AIR DENSITY RATIO 0.9961 DAT 17.8 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET
725A	67.9	3.009	1306.8	.016601	.0046507	0.356	5.4	0.001315	.015285
725B	67.8	3.010	1306.1	.016587	.0046577	0.355	5.5	0.001339	.015248
726A	18.3	0.480	1305.6	.004487	.0007435	0.133	0.9	0.000218	.004269
726B	18.1	0.473	1306.4	.004438	.0007322	0.132	0.9	0.000228	.004210
727A	36.4	0.917	1305.8	.008907	.0014204	0.209	2.2	0.000534	.008374
727B	36.7	0.920	1305.9	.008982	.0014236	0.209	2.2	0.000544	.008438
728A	44.8	1.256	1306.1	.010960	.0019442	0.255	2.8	0.000697	.010263
728B	44.7	1.257	1306.1	.010938	.0019460	0.255	2.9	0.000718	.010220
729A	52.4	1.769	1307.0	.012802	.0027340	0.290	4.0	0.000967	.011835
729B	52.8	1.746	1306.6	.012898	.0026991	0.290	3.8	0.000924	.011973
730A	62.6	2.608	1305.5	.015336	.0040385	0.340	5.2	0.001274	.014062
730B	63.7	2.652	1305.2	.015605	.0041087	0.340	5.4	0.001319	.014287
731A	66.8	2.970	1306.4	.016339	.0045943	0.360	5.8	0.001414	.014925
731B	66.7	2.966	1305.6	.016336	.0045925	0.360	5.6	0.001372	.014964
732A	54.4	1.837	1306.3	.013306	.0028420	0.288	4.0	0.000990	.012316
732B	54.4	1.857	1304.9	.013334	.0028794	0.288	4.2	0.001036	.012298
733A	44.5	1.167	1305.8	.010889	.0018384	0.243	3.1	0.000751	.010138
733B	44.2	1.177	1305.8	.010813	.0018227	0.243	3.2	0.000784	.010029
734A	36.2	0.914	1305.4	.008868	.0014158	0.211	2.5	0.000621	.008247
734B	35.9	0.905	1305.4	.008802	.0014018	0.211	2.6	0.000643	.008160
735A	18.3	0.465	1305.6	.004487	.0007208	0.134	1.4	0.000338	.004149
735B	18.2	0.456	1305.6	.004465	.0007086	0.134	1.4	0.000348	.004117

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 64 CONFIGURATION 18PF39
AIR DENSITY RATIO 1.0487 OAT 6.7 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
866A	982.0	73.469	242.2	.005932	.0004854	0.183	INTERACTION
866B	960.9	73.088	241.6	.005957	.0004854	0.183	INTERACTION
867A	331.7	22.202	241.3	.002019	.0001478	0.068	INTERACTION
867B	320.6	22.110	242.2	.001974	.0001461	0.068	INTERACTION
868A	548.4	35.405	241.9	.003322	.0002345	0.108	INTERACTION
868B	541.6	35.069	242.5	.003263	.0002311	0.108	INTERACTION
869A	764.3	54.229	240.5	.004804	.0003633	0.150	INTERACTION
869B	762.0	54.421	241.0	.004774	.0003633	0.150	INTERACTION
870A	978.2	73.576	243.5	.005848	.0004811	0.185	INTERACTION
870B	995.9	74.389	243.5	.005955	.0004865	0.185	INTERACTION
872A	763.4	52.797	241.7	.004632	.0003504	0.147	INTERACTION
872B	761.6	52.895	241.6	.004626	.0003513	0.147	INTERACTION
873A	541.6	34.745	240.5	.003318	.0002328	0.108	INTERACTION
873B	537.0	34.756	241.2	.003272	.0002316	0.108	INTERACTION
874A	322.3	21.637	241.5	.001959	.0001438	0.064	INTERACTION
874B	327.0	21.892	244.1	.001945	.0001424	0.064	INTERACTION
875A	977.0	73.529	241.9	.005918	.0004871	0.186	ISOLATED
875B	982.3	73.688	242.4	.005925	.0004860	0.186	ISOLATED
876A	767.3	54.186	243.1	.004726	.0003556	0.149	ISOLATED
876B	770.9	53.593	242.3	.004653	.0003538	0.149	ISOLATED
877A	540.6	35.307	243.6	.003276	.0002307	0.108	ISOLATED
877B	544.0	35.009	244.6	.003222	.0002266	0.108	ISOLATED
878A	332.3	22.045	242.0	.002011	.0001459	0.067	ISOLATED
880B	330.6	22.086	244.2	.001965	.0001436	0.067	ISOLATED

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 64 CONFIGURATION 18PF39 ARM= 1.246 M
AIR DENSITY RATIO 1.0487 DAT 6.7 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
866A	66.5	2.656	1308.6	.015406	.0036893	0.346	6.3	0.001462	.013647	.013944
866B	65.0	2.615	1308.5	.015182	.0036304	0.345	6.1	0.001421	.013579	.013760
867A	20.5	0.513	1305.8	.004716	.0007543	0.150	1.8	0.000414	.004142	.004303
867B	20.5	0.513	1304.3	.004789	.0007560	0.150	1.7	0.000394	.004134	.004395
868A	33.9	0.627	1306.7	.007880	.0012145	0.207	2.8	0.000640	.006596	.007240
868B	33.6	0.638	1304.0	.007830	.0012362	0.207	2.4	0.000560	.006560	.007270
869A	47.1	1.273	1304.8	.010958	.0018752	0.264	3.7	0.000870	.010132	.010088
869B	47.5	1.270	1304.7	.011064	.0018705	0.264	3.8	0.000891	.010169	.010173
870A	65.2	2.644	1306.7	.015130	.0038823	0.355	6.2	0.001436	.013706	.013695
870B	65.1	2.632	1306.5	.015114	.0038669	0.354	6.3	0.001457	.013862	.013658
872A	47.0	1.273	1306.3	.010915	.0018695	0.257	4.0	0.000919	.009834	.009996
872B	47.1	1.270	1306.2	.010956	.0018663	0.257	3.3	0.000765	.009862	.010191
873A	28.8	0.707	1306.4	.006685	.0010391	0.199	2.7	0.000630	.006476	.006055
873B	29.3	0.711	1310.6	.006756	.0010374	0.198	2.8	0.000637	.006436	.006119
874A	19.3	0.466	1306.9	.004491	.0007165	0.146	1.7	0.000392	.004029	.004099
874B	19.4	0.473	1311.4	.004471	.0006902	0.146	1.8	0.000410	.004049	.004060
875A	.	.	.	.	.	.	.	.	.	.
875B	.	.	.	.	.	.	.	.	.	.
876A	.	.	.	.	.	.	.	.	.	.
876B	.	.	.	.	.	.	.	.	.	.
877A	.	.	.	.	.	.	.	.	.	.
877B	.	.	.	.	.	.	.	.	.	.
878A	.	.	.	.	.	.	.	.	.	.
878B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 65 CONFIGURATION I8P
AIR DENSITY RATIO 1.0347 OAT 10.6 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
882A	1002.1	75.350	240.8	.006211	.0005108	0.189	INTERACTION
882B	1000.2	75.618	243.7	.006051	.0005003	0.189	INTERACTION
883A	333.1	22.100	242.0	.002043	.0001483	0.072	INTERACTION
883B	331.5	22.125	242.2	.002030	.0001482	0.072	INTERACTION
884A	556.7	35.612	241.4	.003432	.0002401	0.114	INTERACTION
884B	555.3	35.651	242.2	.003400	.0002387	0.114	INTERACTION
885A	772.5	53.676	242.3	.004726	.0003591	0.152	INTERACTION
885B	766.1	53.331	243.4	.004647	.0003538	0.152	INTERACTION
886A	995.5	75.003	242.7	.006069	.0005001	0.189	INTERACTION
886B	994.9	75.011	243.2	.006045	.0004984	0.189	INTERACTION
887A	774.7	53.711	243.1	.004711	.0003572	0.153	INTERACTION
887B	779.8	53.962	239.9	.004867	.0003683	0.153	INTERACTION
886A	550.4	35.097	241.8	.003381	.0002359	0.114	INTERACTION
888B	548.9	35.460	243.0	.003341	.0002360	0.114	INTERACTION
889A	325.4	21.766	241.9	.001998	.0001461	0.067	INTERACTION
889B	327.7	21.770	241.6	.002017	.0001466	0.067	INTERACTION
890A	1004.1	75.854	242.8	.006117	.0005054	0.191	ISOLATED
890B	991.0	75.170	242.6	.006047	.0005017	0.191	ISOLATED
891A	780.4	53.432	244.5	.004689	.0003511	0.154	ISOLATED
891B	772.3	52.974	242.1	.004733	.0003551	0.154	ISOLATED
892A	560.8	35.743	243.8	.003389	.0002363	0.112	ISOLATED
892B	558.6	35.536	242.6	.003408	.0002372	0.112	ISOLATED
893A	330.5	21.648	242.2	.002024	.0001450	0.068	ISOLATED
893B	333.1	21.764	242.3	.002038	.0001456	0.067	ISOLATED

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 65 CONFIGURATION 18P ARM= 1.206 M
AIR DENSITY RATIO 1.0347 OAT 10.6 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
882A	60.9	2.288	1304.2	.014385	.0034183	0.327	0.0	0.000000	.014282	.014385
882B	59.1	2.191	1309.9	.013842	.0032444	0.326	0.0	0.000000	.014207	.013842
883A	17.5	0.471	1305.9	.004119	.0007021	0.146	0.0	0.000000	.004178	.004119
883B	17.4	0.461	1305.3	.004112	.0006875	0.146	0.0	0.000000	.004186	.004112
884A	29.7	0.733	1307.0	.006989	.0010908	0.203	0.0	0.000000	.006721	.006989
884B	29.3	0.738	1306.2	.006904	.0010989	0.203	0.0	0.000000	.006737	.006904
885A	44.7	1.224	1305.5	.010528	.0018243	0.257	0.0	0.000000	.010152	.010528
885B	46.2	1.304	1301.6	.010962	.0019558	0.256	0.0	0.000000	.010149	.010962
886A	59.5	2.203	1307.7	.013983	.0032738	0.326	0.0	0.000000	.014139	.013983
886B	57.7	2.098	1309.0	.013529	.0031117	0.325	0.0	0.000000	.014113	.013529
887A	45.1	1.236	1307.2	.010595	.0018381	0.261	0.0	0.000000	.010133	.010595
887B	45.2	1.227	1301.5	.010721	.0018409	0.261	0.0	0.000000	.010271	.010721
888A	28.8	0.714	1307.4	.006775	.0010615	0.209	0.0	0.000000	.006619	.006775
888B	29.0	0.737	1306.7	.006825	.0010964	0.209	0.0	0.000000	.006695	.006825
889A	17.7	0.468	1305.3	.004185	.0006976	0.140	0.0	0.000000	.004118	.004185
889B	17.4	0.469	1304.3	.004108	.0007004	0.140	0.0	0.000000	.004126	.004108
890A	.	.	.	.	.	.	.	.	.	.
890B	.	.	.	.	.	.	.	.	.	.
891A	.	.	.	.	.	.	.	.	.	.
891B	.	.	.	.	.	.	.	.	.	.
892A	.	.	.	.	.	.	.	.	.	.
892B	.	.	.	.	.	.	.	.	.	.
893A	.	.	.	.	.	.	.	.	.	.
893B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 66 CONFIGURATION I4P
AIR DENSITY RATIO 1.0207 OAT 14.4 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
898A	985.1	74.748	244.9	.005979	.0004962	0.188	INTERACTION
898B	975.9	74.166	242.8	.006026	.0005009	0.188	INTERACTION
899A	355.5	22.900	242.8	.002195	.0001547	0.075	INTERACTION
899B	348.9	22.751	242.8	.002155	.0001536	0.075	INTERACTION
900A	544.2	35.548	243.1	.003355	.0002397	0.113	INTERACTION
900B	547.0	35.470	242.3	.003392	.0002406	0.113	INTERACTION
901A	782.6	54.211	242.6	.004841	.0003668	0.154	INTERACTION
901B	777.8	53.960	242.5	.004815	.0003654	0.154	INTERACTION
902A	982.1	74.342	243.9	.006012	.0004978	0.188	INTERACTION
902B	977.3	73.809	243.3	.006014	.0004968	0.188	INTERACTION
903A	773.6	54.281	243.3	.004760	.0003653	0.156	INTERACTION
903B	772.8	54.200	241.3	.004834	.0003708	0.156	INTERACTION
904A	563.8	36.461	241.9	.003508	.0002482	0.117	INTERACTION
904B	554.5	36.142	243.7	.003401	.0002424	0.116	INTERACTION
905A	337.8	22.291	242.1	.002098	.0001515	0.070	INTERACTION
905B	334.6	22.147	242.6	.002066	.0001496	0.069	INTERACTION
906A	975.0	73.413	243.3	.006000	.0004941	0.185	ISOLATED
906B	961.5	72.766	242.6	.005948	.0004923	0.185	ISOLATED
907A	792.9	55.188	242.6	.004904	.0003734	0.156	ISOLATED
907B	789.7	55.040	244.1	.004826	.0003679	0.156	ISOLATED
908A	550.3	35.609	243.0	.003397	.0002403	0.114	ISOLATED
908B	555.7	35.889	242.5	.003440	.0002430	0.114	ISOLATED
909A	329.6	21.830	241.9	.002051	.0001486	0.069	ISOLATED
909B	340.4	22.138	243.6	.002090	.0001486	0.070	ISOLATED

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 66 CONFIGURATION 14P ARM= 1.088 M
AIR DENSITY RATIO 1.0207 OAT 14.4 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
898A	66.1	2.971	1309.4	.015692	.0044645	0.384	0.0	0.000000	.016315	.015692
898B	65.7	2.946	1309.8	.015608	.0044260	0.384	0.0	0.000000	.016178	.015608
899A	20.1	0.517	1308.3	.004795	.0007788	0.173	0.0	0.000000	.005007	.004795
899B	20.3	0.5[illegible]1	1308.8	.004834	.0007833	0.172	0.0	0.000000	.004971	.004834
900A	34.9	0.896	1311.3	.008271	.0013423	0.226	0.0	0.000000	.007737	.008271
900B	35.4	0.885	1305.8	.008459	.0013366	0.226	0.0	0.000000	.007786	.008459
901A	50.8	1.614	1306.9	.012114	.0024351	0.306	0.0	0.000000	.011878	.012114
901B	51.6	1.595	1307.1	.012301	.0024054	0.306	0.0	0.000000	.011820	.012301
902A	66.3	2.985	1305.6	.015836	.0045108	0.383	0.0	0.000000	.016321	.015836
902B	67.0	3.002	1312.0	.015850	.0044924	0.383	0.0	0.000000	.016046	.015850
903A	51.9	1.682	1307.4	.012369	.0025353	0.313	0.0	0.000000	.011884	.012369
903B	52.4	1.675	1308.4	.012468	.0025215	0.313	0.0	0.000000	.011849	.012468
904A	32.6	0.856	1313.5	.007698	.0012787	0.233	0.0	0.000000	.007909	.007698
904B	33.1	0.861	1313.3	.007826	.0012859	0.233	0.0	0.000000	.007842	.007826
905A	20.1	0.514	1306.4	.004799	.0007760	0.164	0.0	0.000000	.004888	.004799
905B	20.6	0.521	1306.4	.004926	.0007862	0.164	0.0	0.000000	.004857	.004926
906A	.	.	.	.	.	.	.	.	.	.
906B	.	.	.	.	.	.	.	.	.	.
907A	.	.	.	.	.	.	.	.	.	.
907B	.	.	.	.	.	.	.	.	.	.
908A	.	.	.	.	.	.	.	.	.	.
908B	.	.	.	.	.	.	.	.	.	.
909A	.	.	.	.	.	.	.	.	.	.
909B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 67 CONFIGURATION 14PF39
AIR DENSITY RATIO 1.0096 OAT 17.2 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
913A	910.0	67.780	242.4	.005700	.0004644	0.180	INTERACTION
913B	894.8	67.071	242.0	.005625	.0004611	0.180	INTERACTION
914A	302.6	20.936	244.2	.001868	.0001414	0.064	INTERACTION
914B	300.2	20.788	240.1	.001917	.0001452	0.064	INTERACTION
915A	529.8	34.414	243.4	.003293	.0002340	0.110	INTERACTION
915B	523.3	34.235	243.0	.003264	.0002336	0.110	INTERACTION
916A	742.8	51.600	242.2	.004661	.0003541	0.150	INTERACTION
916B	751.6	52.133	242.6	.004700	.0003566	0.150	INTERACTION
917A	899.1	66.005	242.7	.005618	.0004511	0.177	INTERACTION
917B	892.1	65.559	243.3	.005550	.0004461	0.177	INTERACTION
918A	752.3	51.954	242.7	.004701	.0003550	0.150	INTERACTION
918B	747.9	51.854	242.6	.004677	.0003547	0.150	INTERACTION
919A	534.4	34.414	241.9	.003362	.0002368	0.110	INTERACTION
919B	531.9	34.270	242.5	.003329	.0002346	0.110	INTERACTION
920A	305.9	20.582	241.8	.001926	.0001417	0.063	INTERACTION
920B	304.1	20.699	243.7	.001885	.0001404	0.062	INTERACTION
921A	952.8	71.110	243.3	.005927	.0004839	0.186	ISOLATED
921B	955.8	71.279	244.2	.005900	.0004813	0.186	ISOLATED
922A	777.6	53.166	243.8	.004817	.0003602	0.152	ISOLATED
922B	757.0	52.695	242.0	.004759	.0003623	0.152	ISOLATED
923A	535.2	34.291	244.0	.003310	.0002319	0.110	ISOLATED
923B	530.2	34.388	243.3	.003298	.0002340	0.110	ISOLATED
924A	313.1	21.046	244.6	.001926	.0001416	0.064	ISOLATED
924B	313.6	21.074	245.0	.001923	.0001413	0.064	ISOLATED

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 67 CONFIGURATION I4PF39 ARM= 1.088 M
AIR DENSITY RATIO 1.0096 OAT 17.2 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
913A	66.1	2.907	1314.3	.015746	.0043828	0.376	6.0	0.001442	.014845	.014304
913B	66.3	2.889	1312.1	.015852	.0043701	0.375	6.7	0.001606	.014739	.014245
914A	21.0	0.494	1307.8	.005065	.0007518	0.165	1.1	0.000257	.004631	.004808
914B	21.6	0.511	1299.7	.005270	.0007874	0.165	1.6	0.000380	.004656	.004891
915A	35.3	0.877	1304.9	.008530	.0013410	0.228	2.6	0.000624	.007647	.007906
915B	34.5	0.863	1306.1	.008333	.0013179	0.228	3.0	0.000719	.007594	.007613
916A	52.4	1.687	1306.8	.012646	.0025726	0.309	4.6	0.001116	.011432	.011530
916B	52.2	1.722	1305.9	.012600	.0026298	0.309	4.2	0.001010	.011567	.011590
917A	66.1	2.931	1308.3	.015914	.0044597	0.376	6.8	0.001627	.014591	.014287
917B	69.3	3.018	1305.8	.016749	.0046097	0.375	7.2	0.001730	.014548	.015019
918A	53.8	1.775	1303.0	.013043	.0027226	0.310	4.3	0.001046	.011577	.011996
918B	53.6	1.732	1306.6	.012929	.0026423	0.309	4.7	0.001127	.011492	.011802
919A	34.5	.636	1310.9	.008261	.0012671	0.220	3.0	0.000714	.007577	.007547
919B	35.1	0.841	1305.1	.008485	.0012853	0.220	2.8	0.000688	.007612	.007796
920A	20.1	0.488	1305.5	.004847	.0007458	0.163	1.8	0.000441	.004569	.004406
920B	20.4	0.482	1309.4	.004904	.0007328	0.163	1.8	0.000427	.004568	.004476
921A	.	.	.	.	.	.	.	.	.	.
921B	.	.	.	.	.	.	.	.	.	.
922A	.	.	.	.	.	.	.	.	.	.
922B	.	.	.	.	.	.	.	.	.	.
923A	.	.	.	.	.	.	.	.	.	.
923B	.	.	.	.	.	.	.	.	.	.
924A	.	.	.	.	.	.	.	.	.	.
924B	.	.	.	.	.	.	.	.	.	.

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 68 CONFIGURATION 13PF39
AIR DENSITY RATIO 1.0218 OAT 10.6 DEG C

MAIN ROTOR DATA

REF #	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
930A	904.7	66.077	241.8	.005629	.0004497	0.177	INTERACTION
930B	917.6	66.789	241.7	.005714	.0004549	0.177	INTERACTION
931A	320.7	21.072	241.6	.001999	.0001436	0.066	INTERACTION
931B	321.7	21.239	241.6	.002005	.0001448	0.066	INTERACTION
932A	532.1	33.752	239.7	.003369	.0002337	0.108	INTERACTION
932B	530.9	33.490	241.5	.003312	.0002285	0.108	INTERACTION
933A	755.9	51.735	241.6	.004711	.0003527	0.150	INTERACTION
933B	771.6	52.103	241.7	.004805	.0003555	0.150	INTERACTION
934A	915.0	66.507	2[illegible]2.5	.005658	.0004498	0.177	INTERACTION
934B	897.6	65.783	243.7	.005499	.0004407	0.177	INTERACTION
935A	766.7	52.011	242.1	.004758	.0003530	0.149	INTERACTION
935B	757.3	51.717	242.7	.004675	.0003492	0.149	INTERACTION
936A	540.0	33.843	243.1	.003325	.0002279	0.109	INTERACTION
936B	539.7	33.967	242.7	.003332	.0002294	0.109	INTERACTION
937A	312.2	20.557	240.8	.001959	.0001411	0.062	INTERACTION
937B	312.7	20.592	240.9	.001961	.0001412	0.062	INTERACTION
938A	989.1	72.620	241.8	.006154	.0004955	0.186	ISOLATED
938B	987.3	73.023	242.5	.006106	.0004939	0.166	ISOLATED
939A	770.7	51.505	242.2	.004779	.0003493	0.149	ISOLATED
939B	765.4	51.614	241.2	.004787	.0003531	0.149	ISOLATED
940A	540.3	33.396	241.6	.003368	.0002276	0.108	ISOLATED
940B	538.2	33.430	242.4	.003331	.0002263	0.108	ISOLATED
941A	315.6	20.318	242.2	.001957	.0001378	0.062	ISOLATED
941B	312.1	20.148	242.4	.001932	.0001364	0.062	ISOLATED

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 68 CONFIGURATION 13PF39 ARM= 1.088 M
AIR DENSITY RATIO 1.0218 DAT 10.6 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
930A	67.2	3.017	1308.4	.015975	.0045348	0.379	6.5	0.001544	.014430	.014432
930B	67.2	2.980	1310.8	.015906	.0044640	0.379	6.9	0.001643	.014532	.014263
93.A	22.4	0.526	1307.0	.005340	.0007931	0.171	1.6	0.000371	.004611	.004969
931B	22.0	0.523	1306.6	.005248	.0007685	0.171	1.7	0.000413	.004651	.004634
932A	34.0	0.851	1305.4	.008124	.0012847	0.229	3.3	0.000797	.007404	.007328
932B	34.6	0.862	1311.8	.008193	.0012891	0.229	3.1	0.000726	.007276	.007467
933A	53.0	1.751	1307.4	.012621	.0026363	0.315	5.5	0.001313	.011314	.011308
933B	53.9	1.773	1306.7	.012847	.0026717	0.314	4.9	0.001166	.011428	.011681
934A	66.9	2.935	1305.4	.015983	.0044323	0.377	6.9	0.001657	.014590	.014326
934B	68.4	3.010	1300.5	.016458	.0045794	0.376	6.6	0.001594	.014540	.014863
935A	53.6	1.778	1306.8	.012781	.0026797	0.309	5.1	0.001208	.011386	.011573
935B	53.6	1.783	1310.3	.012693	.0026724	0.309	5.2	0.001233	.011262	.011459
936A	35.9	0.852	1306.8	.008563	.0012837	0.222	3.4	0.000805	.007409	.007758
936B	35.4	0.848	1306.5	.008440	.0012792	0.222	3.4	0.000806	.007439	.007634
937A	22.2	0.528	1312.7	.005241	.0007680	0.170	1.9	0.000441	.004460	.004800
937B	21.8	0.526	1312.0	.005162	.0007887	0.170	1.8	0.000421	.004472	.004742
938A	.	.	.	.	.	.	.	.	.	.
938B	.	.	.	.	.	.	.	.	.	.
939A	.	.	.	.	.	.	.	.	.	.
939B	.	.	.	.	.	.	.	.	.	.
940A	.	.	.	.	.	.	.	.	.	.
940B	.	.	.	.	.	.	.	.	.	.
941A	.	.	.	.	.	.	.	.	.	.
941B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 69 CONFIGURATION 13P
AIR DENSITY RATIO 1.0218 OAT 10.6 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
945A	951.2	70.657	242.1	.005903	.0004796	0.182	INTERACTION
945B	943.2	70.727	243.7	.005778	.0004739	0.182	INTERACTION
946A	339.0	22.116	241.9	.002107	.0001504	0.072	INTERACTION
946B	340.3	22.239	242.4	.002106	.0001506	0.072	INTERACTION
947A	562.1	35.983	241.0	.003522	.0002466	0.113	INTERACTION
947B	555.0	35.835	244.0	.003391	.0002395	0.113	INTERACTION
948A	777.0	54.143	243.8	.004756	.0003625	0.151	INTERACTION
948B	771.0	53.767	242.5	.004768	.0003637	0.151	INTERACTION
949A	953.7	70.814	241.1	.005970	.0004848	0.180	INTERACTION
949B	952.7	71.015	243.1	.005866	.0004783	0.180	INTERACTION
950A	784.2	54.541	242.4	.004854	.0003692	0.153	INTERACTION
950B	780.4	54.378	242.2	.004838	.0003686	0.153	INTERACTION
951A	572.8	36.533	245.0	.003470	.0002421	0.114	INTERACTION
951B	572.9	36.601	244.9	.003474	.0002427	0.114	INTERACTION
952A	340.4	22.111	242.5	.002105	.0001496	0.071	INTERACTION
952B	335.4	21.981	240.6	.002107	.0001510	0.070	INTERACTION
953A	1021.2	76.251	242.8	.006299	.0005144	0.191	ISOLATED
953B	1009.5	75.448	243.3	.006205	.0005072	0.191	ISOLATED
954A	961.0	70.808	243.9	.005877	.0004736	0.182	ISOLATED
954B	960.3	70.914	243.3	.005903	.0004768	0.183	ISOLATED
955A	791.8	54.520	243.0	.004880	.0003675	0.154	ISOLATED
955B	793.7	54.631	243.1	.004888	.0003679	0.154	ISOLATED
956A	562.9	35.895	244.3	.003431	.0002393	0.114	ISOLATED
956B	569.1	36.151	242.4	.003522	.0002447	0.114	ISOLATED
957A	330.3	21.465	242.7	.002039	.0001449	0.070	ISOLATED
957B	335.7	21.705	242.4	.002078	.0001469	0.069	ISOLATED

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 69 CONFIGURATION 13P ARM= 1.088 M
AIR DENSITY RATIO 1.0218 OAT 10.6 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
945A	64.3	2.697	1305.9	.015347	.0043715	0.379	0.0	0.000000	.015490	.015347
945B	64.9	2.931	1308.6	.015431	.0044043	0.378	0.0	0.000000	.015441	.015431
946A	19.9	0.511	1304.5	.004765	.0007723	0.167	0.0	0.000000	.004859	.004765
946B	20.1	0.506	1307.5	.004774	.0007619	0.167	0.0	0.000000	.004863	.004774
947A	32.7	0.836	1314.7	.007707	.0012448	0.226	0.0	0.000000	.007783	.007707
947B	33.4	0.847	1314.8	.007873	.0012615	0.227	0.0	0.000000	.007750	.007873
948A	49.6	1.536	1304.4	.011871	.0023257	0.300	0.0	0.000000	.011896	.011871
948B	50.1	1.572	1307.1	.011938	.0023670	0.299	0.0	0.000000	.011765	.011938
949A	64.4	2.883	1308.7	.015291	.0043323	0.378	0.0	0.000000	.015457	.015291
949B	65.3	2.925	1309.6	.015501	.0043888	0.378	0.0	0.000000	.015479	.015501
950A	49.8	1.505	1310.4	.011795	.0022554	0.292	0.0	0.000000	.011875	.011795
950B	49.1	1.474	1310.3	.011628	.0022101	0.292	0.0	0.000000	.011841	.011628
951A	33.0	0.624	1308.7	.007830	.0012376	0.219	0.0	0.000000	.007975	.007830
951B	32.8	0.635	1306.4	.007826	.0012590	0.219	0.0	0.000000	.008018	.007826
952A	18.4	0.461	1308.1	.004369	.0006933	0.152	0.0	0.000000	.004831	.004369
952B	18.5	0.467	1304.0	.004439	.0007062	0.152	0.0	0.000000	.004833	.004439
953A	.	.	.	.	.	.	.	.	.	.
953B	.	.	.	.	.	.	.	.	.	.
954A	.	.	.	.	.	.	.	.	.	.
954B	.	.	.	.	.	.	.	.	.	.
955A	.	.	.	.	.	.	.	.	.	.
955B	.	.	.	.	.	.	.	.	.	.
956A	.	.	.	.	.	.	.	.	.	.
95[illegible]	.	.	.	.	.	.	.	.	.	.
957A	.	.	.	.	.	.	.	.	.	.
957B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 70   CONFIGURATION 17PF39
AIR DENSITY RATIO 1.0119   OAT 13.3 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
963A	1004.1	75.149	244.5	.006169	.0005049	0.191	INTERACTION
963B	1000.9	75.329	243.4	.006208	.0005110	0.191	INTERACTION
964A	332.4	22.062	242.6	.002074	.0001506	0.069	INTERACTION
964B	336.5	22.220	244.1	.002074	.0001498	0.069	INTERACTION
965A	566.9	36.149	242.4	.003543	.0002471	0.113	INTERACTION
965B	557.8	35.982	243.0	.003471	.0002449	0.113	INTERACTION
966A	763.2	52.718	242.5	.004766	.0003601	0.151	INTERACTION
966B	784.1	53.660	241.[illegible]	.004956	.0003710	0.151	INTERACTION
967A	1001.6	75.810	243.1	.006228	.0005156	0.190	INTERACTION
967B	983.9	74.713	242.6	.006139	.0005098	0.191	INTERACTION
968A	777.6	53.899	242.5	.004856	.0003681	0.153	INTERACTION
968B	769.4	53.599	242.3	.004813	.0003667	0.153	INTERACTION
969A	545.9	34.949	243.8	.003374	.0002362	0.110	INTERACTION
969B	544.9	34.984	243.3	.003382	.0002375	0.110	INTERACTION
970A	334.7	22.177	242.0	.002099	.0001521	0.068	INTERACTION
970B	326.8	21.979	242.3	.002045	.0001504	0.068	INTERACTION
971A	986.7	74.962	242.8	.006158	.0005107	0.192	ISOLATED
971B	999.4	74.739	242.7	.006230	.0005096	0.192	ISOLATED
972A	784.8	53.922	243.5	.004863	.0003654	0.153	ISOLATED
972B	781.9	53.921	243.8	.004832	.0003645	0.153	ISOLATED
973A	553.7	35.601	243.2	.003440	.0002419	0.112	ISOLATED
973B	559.5	35.712	243.7	.003461	.0002416	0.112	ISOLATED
974A	337.4	22.289	243.4	.002093	.0001512	0.069	ISOLATED
974B	337.1	22.222	244.9	.002064	.0001488	0.069	ISOLATED

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 70 CONFIGURATION 17PF39 ARM= 1.206 M
AIR DENSITY RATIO 1.0119 OAT 13.3 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
963A	67.0	2.930	1303.7	.016205	.0044793	0.377	6.7	0.001613	.014576	.014592
963B	69.3	2.986	1306.8	.016673	.0045437	0.376	6.2	0.001488	.014541	.015186
964A	20.1	0.494	1310.2	.004802	.0007474	0.157	1.0	0.000245	.004237	.004557
964B	20.2	0.465	1299.8	.004911	.0007160	0.157	1.6	0.000379	.004336	.004533
965A	32.8	0.765	1306.5	.007691	.0011644	0.206	2.4	0.000567	.006981	.007323
965B	32.0	0.751	1305.6	.0[illegible]71[illegible]	.0011453	0.207	2.0	0.000482	.006958	.007236
966A	49.9	1.453	1311.1	.011929	.0021964	0.285	2.9	0.000702	.010110	.011227
966B	47.1	1.325	1306.7	.011335	.0020169	0.285	4.1	0.000995	.010360	.010339
967A	68.1	2.978	1306.2	.016411	.0045361	0.375	6.5	0.001575	.014648	.014836
967B	67.7	2.932	1309.2	.016239	.0044448	0.374	6.3	0.001514	.014369	.014725
968A	48.5	1.346	1307.8	.011657	.0020442	0.284	4.0	0.000972	.010388	.010665
968B	48.5	1.361	1306.5	.011670	.0020726	0.283	3.6	0.000878	.010351	.010792
969A	31.2	0.738	1300.6	.007584	.0011333	0.207	2.6	0.000637	.006811	.006947
969B	32.[illegible]	0.746	1305.3	.007765	.0011372	0.206	2.2	0.000536	.006768	.007229
970A	19.9	0.471	1305.9	.004801	.0007179	0.159	1.5	0.000354	.004287	.004448
970B	19.5	0.471	1304.8	.004712	.0007191	0.159	1.6	0.000386	.004256	.004326
971A	.	.	.	.	.	.	.	.	.	.
971B	.	.	.	.	.	.	.	.	.	.
972A	.	.	.	.	.	.	.	.	.	.
972B	.	.	.	.	.	.	.	.	.	.
973A	.	.	.	.	.	.	.	.	.	.
973B	.	.	.	.	.	.	.	.	.	.
974A	.	.	.	.	.	.	.	.	.	.
974B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 7?   CONFIGURATION I6PF18
AIR DENSITY RATIO 0.9969   OAT 14.4 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
977A	996.0	76.674	242.3	.006324	.0005325	0.194	INTERACTION
977B	993.7	76.659	242.3	.006310	.0005324	0.194	INTERACTION
978A	334.7	22.365	242.0	.002131	.0001559	0.070	INTERACTION
978B	333.6	22.419	244.1	.002087	.0001534	0.070	INTERACTION
979A	556.4	36.189	242.8	.003518	.0002502	0.113	INTERACTION
979B	557.3	36.[illegible]74	241.2	.003572	.0002536	0.113	INTERACTION
980A	782.3	54.801	241.4	.005006	.0003836	0.153	INTERACTION
980B	787.0	55.004	241.8	.005019	.0003836	0.153	INTERACTION
981A	983.5	74.983	242.2	.006251	.0005212	0.190	INTERACTION
981B	977.9	74.606	241.8	.006236	.0005204	0.190	INTERACTION
982A	779.6	54.778	[illegible]	.004950	.0003804	0.153	INTERACTION
982B	775.5	54.442	24[illegible].2	.004890	.0003755	0.153	INTERACTION
983A	552.6	36.123	241.9	.003521	.0002517	0.113	INTERACTION
983B	555.6	36.198	241.7	.003546	.0002527	0.113	INTERACTION
984A	337.8	22.417	241.6	.002158	.0001566	0.069	INTERACTION
984B	330.4	22.414	241.8	.002107	.0001563	0.125	INTERACTION
985A	1005.4	76.774	243.1	.006352	.0005300	0.194	ISOLATED
985B	1003.4	76.382	242.0	.006388	.0005318	0.194	ISOLATED
986A	768.1	53.772	243.8	.004819	.0003690	0.152	ISOLATED
986B	771.0	54.034	243.2	.004862	.0003727	0.152	ISOLATED
987A	558.8	36.294	243.3	.003520	.0002501	0.113	ISOLATED
987B	559.1	36.213	243.0	.003532	.0002502	0.113	ISOLATED
988A	332.8	22.216	242.6	.002108	.0001539	0.069	ISOLATED
988B	328.1	22.206	243.0	.002072	.0001534	0.069	ISOLATED

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 71 CONFIGURATION 16PF18 ARM= 1.246 M
AIR DENSITY RATIO 0.9969 OAT 14.4 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE ([illegible])	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
977A	65.1	2.924	1307.6	.015883	.0045104	0.378	2.7	0.000651	.015004	.015232
977B	62.8	2.855	1307.6	.015308	.0044040	0.378	2.9	0.000716	.015001	.014592
978A	19.4	0.494	1303.4	.004771	.0007665	0.166	0.4	0.000109	.004409	.004662
978B	19.3	0.485	1297.1	.004796	.0007599	0.165	0.3	0.000077	.004459	.004719
979A	32.0	0.811	1306.9	.007809	.0012527	0.221	0.9	0.000217	.007390	.007592
979B	31.9	0.806	1305.5	.007804	.0012466	0.221	0.9	0.000218	.007102	.007586
980A	46.7	1.426	1305.5	.011428	.0022065	0.296	1.4	0.000348	.010758	.011080
980B	47.3	1.466	1306.9	.011545	.0022647	0.296	1.8	0.000434	.010776	.011111
981A	63.7	2.879	1308.9	.015495	.0044321	0.376	3.2	0.000790	.014645	.014704
981B	65.7	2.956	1306.0	.016076	.0045709	0.376	2.8	0.000685	.014637	.015390
982A	47.5	1.479	1308.4	.011563	.0022788	0.294	2.4	0.000574	.010707	.010988
982B	47.9	1.524	1306.4	.011696	.0023556	0.294	2.2	0.000543	.010674	.011152
983A	32.2	0.791	1306.4	.007870	.0012223	0.214	1.1	0.000261	.007082	.007609
983B	31.9	0.790	1306.0	.007809	.0012213	0.214	1.4	0.000337	.007102	.007472
984A	21.3	0.521	1304.8	.005219	.0008069	0.164	0.5	0.000131	.004406	.005088
984B	20.4	0.511	1299.9	.005039	.0007972	0.164	0.9	0.000220	.004439	.004820
985A	.	.	.	.	.	.	.	.	.	.
985B	.	.	.	.	.	.	.	.	.	.
986A	.	.	.	.	.	.	.	.	.	.
986B	.	.	.	.	.	.	.	.	.	.
987A	.	.	.	.	.	.	.	.	.	.
987B	.	.	.	.	.	.	.	.	.	.
988A	.	.	.	.	.	.	.	.	.	.
988B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 73 CONFIGURATION I13PF18
AIR DENSITY RATIO 0.9893 OAT 16.7 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1015A	907.5	69.388	245.6	.005654	.0004728	0.182	INTERACTION
1015B	916.7	69.943	244.1	.005780	.0004824	0.182	INTERACTION
1016A	317.0	22.228	242.8	.002019	.0001549	0.069	INTERACTION
1016B	313.6	22.184	243.8	.001983	.0001534	0.069	INTERACTION
1017A	545.4	36.269	244.5	.003427	.0002493	0.114	INTERACTION
1017B	547.1	36.417	243.8	.003458	.0002518	0.114	INTERACTION
1018A	762.8	54.530	243.6	.004831	.0003777	0.155	INTERACTION
1018B	774.1	54.959	243.8	.004894	.0003800	0.155	INTERACTION
1019A	894.0	67.513	243.5	.005666	.0004680	0.181	INTERACTION
1019B	902.9	67.800	243.5	.005722	.0004700	0.181	INTERACTION
1020A	774.2	55.261	243.2	.004920	.0003841	0.156	INTERACTION
1020B	769.3	55.216	243.6	.004872	.0003824	0.156	INTERACTION
1021A	541.2	36.150	244.0	.003415	.0002495	0.113	INTERACTION
1021B	540.5	36.251	243.2	.003434	.0002519	0.113	INTERACTION
1022A	325.0	22.119	243.8	.002054	.0001529	0.068	INTERACTION
1022B	313.9	21.774	243.5	.001989	.0001509	0.068	INTERACTION
1023A	980.7	75.558	244.0	.006189	.0005215	0.193	ISOLATED
1023B	999.0	76.119	244.1	.006299	.0005249	0.193	ISOLATED
1024A	917.0	67.342	246.4	.005675	.0004558	0.179	ISOLATED
1024B	892.2	66.436	244.8	.005592	.0004554	0.179	ISOLATED
1025A	778.4	54.412	243.9	.004917	.0003759	0.154	ISOLATED
1025B	774.9	54.419	243.6	.004907	.0003769	0.154	ISOLATED
1026A	533.2	34.799	244.4	.003353	.0002394	0.111	ISOLATED
1026B	539.5	34.982	246.0	.003350	.0002376	0.111	ISOLATED
1027A	313.1	21.250	243.7	.001981	.0001471	0.065	ISOLATED
1027B	313.1	21.237	243.5	.001984	.0001472	0.065	ISOLATED

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 73 CONFIGURATION 113PF18 ARM= 1.167 M
AIR DENSITY RATIO 0.9893 OAT 16.7 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1015A	61.0	2.723	1307.4	.015004	.0042338	0.369	3.5	0.000853	.014613	.014151
1015B	61.1	2.734	1310.2	.014963	.0042337	0.367	3.5	0.000660	.014669	.014103
1016A	20.2	0.521	1301.9	.005007	.0008168	0.172	1.0	0.000243	.004721	.004765
1016B	19.9	0.511	1306.0	.004899	.0007958	0.172	1.1	0.000263	.004682	.004636
1017A	33.2	0.853	1300.9	.008251	.0013396	0.230	1.5	0.000376	.007715	.007675
1017B	33.2	0.842	1310.3	.008123	.0013031	0.230	1.6	0.000381	.007636	.007742
1018A	49.1	1.675	1305.2	.012114	.0026140	0.316	2.6	0.000647	.011523	.011466
1018B	49.8	1.691	1306.1	.012273	.0026353	0.316	2.8	0.000679	.011599	.011594
1019A	61.9	2.793	1310.6	.015139	.0043219	0.373	3.6	0.000882	.014150	.014257
1019B	59.7	2.710	1308.4	.014665	.0042084	0.372	3.7	0.000917	.014258	.013748
1020A	50.7	1.785	1299.3	.012613	.0028107	0.316	2.8	0.000709	.011785	.011904
1020B	50.4	1.770	1305.8	.012422	.0027599	0.315	2.8	0.000702	.011658	.011720
1021A	33.8	0.852	1303.1	.008355	.0013333	0.224	1.6	0.000396	.007664	.007959
1021B	33.5	0.843	1304.6	.008268	.0013158	0.224	1.7	0.000428	.007665	.007639
1022A	21.9	0.516	1309.4	.005375	.0008004	0.169	0.9	0.000229	.004644	.005146
1022B	20.7	0.501	1304.1	.005111	.0007822	0.170	1.0	0.000242	.004609	.004669
1023A	.	.	.	.	.	.	.	.	.	.
1023B	.	.	.	.	.	.	.	.	.	.
1024A	.	.	.	.	.	.	.	.	.	.
1024B	.	.	.	.	.	.	.	.	.	.
1025A	.	.	.	.	.	.	.	.	.	.
1025B	.	.	.	.	.	.	.	.	.	.
1026A	.	.	.	.	.	.	.	.	.	.
1026B	.	.	.	.	.	.	.	.	.	.
1027A	.	.	.	.	.	.	.	.	.	.
1027B	.	.	.	.	.	.	.	.	.	.

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 74 CONFIGURATION I1PF18
AIR DENSITY RATIO 0.9636 OAT 23.9 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1032A	813.1	58.552	243.4	.005296	.0004171	0.168	INTERACTION
1032B	803.0	58.328	243.6	.005221	.0004148	0.168	INTERACTION
1033A	779.7	56.022	244.0	.005052	.0003970	0.161	INTERACTION
1033B	764.9	54.960	243.9	.005090	.0003898	0.161	INTERACTION
1034A	323.5	22.253	243.5	.002105	.0001584	0.076	INTERACTION
1034B	338.3	22.611	243.6	.002199	.0001608	0.076	INTERACTION
1035A	547.1	36.174	243.1	.003573	.0002583	0.119	INTERACTION
1035B	544.6	36.349	243.5	.003544	.0002587	0.119	INTERACTION
1036A	773.9	54.717	243.6	.005031	.0003891	0.161	INTERACTION
1036B	776.7	54.807	244.0	.005032	.0003884	0.161	INTERACTION
1037A	565.7	37.216	243.9	.003669	.0002640	0.120	INTERACTION
1037B	566.0	37.388	242.7	.003705	.0002677	0.120	INTERACTION
1038A	338.6	22.632	243.9	.002196	.0001605	0.076	INTERACTION
1038B	345.4	22.828	243.3	.002252	.0001627	0.076	INTERACTION
1040A	764.4	56.203	243.6	.005100	.0003996	0.16[illegible]	ISOLATED
1041A	550.2	36.598	243.2	.003589	.0002611	0.11[illegible]	ISOLATED
1041B	557.6	36.966	244.5	.003598	.0002608	0.119	ISOLATED
1042A	318.3	21.706	243.4	.002073	.0001546	0.073	ISOLATED
1042B	326.0	22.124	245.6	.002086	.0001548	0.073	ISOLATED

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 74 CONFIGURATION 11PF18 ARM= 1.088 M
AIR DENSITY RATIO 0.9636 OAT 23.9 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1032A	57.7	2.656	1307.0	.014571	.0042430	0.375	3.8	0.000966	.013588	.013605
1032B	60.0	2.736	1306.3	.015161	.0043760	0.374	3.4	0.000855	.013551	.014306
1033A	54.8	2.316	1303.9	.013908	.0037176	0.352	2.9	0.000745	.013063	.013163
1033B	56.4	2.366	1300.5	.014399	.0038170	0.350	3.0	0.000760	.012882	.013639
1034A	25.7	0.608	1302.7	.006525	.0009774	0.193	0.5	0.000124	.005198	.006401
1034B	24.9	0.592	1303.8	.006311	.0009504	0.193	1.6	0.000406	.005273	.005905
1035A	39.0	1.019	1304.6	.009878	.0016339	0.253	1.1	0.000282	.008426	.009596
1035B	36.4	0.981	1304.3	.009228	.0015731	0.253	2.2	0.000553	.008470	.008675
1036A	55.9	2.470	1304.6	.014174	.0039598	0.362	4.6	0.001173	.012745	.013001
1036B	54.5	2.365	1306.6	.013771	.0037798	0.360	4.0	0.001001	.012727	.012771
1037A	38.9	1.045	1301.7	.009900	.0016831	0.255	1.8	0.000464	.008707	.009435
1037B	39.0	1.052	1303.7	.009903	.0016889	0.255	2.2	0.000553	.008721	.009350
1038A	25.8	0.638	1305.6	.006541	.0010218	0.192	1.1	0.000281	.005263	.006259
1038B	25.2	0.638	1304.3	.006397	.0010239	0.193	1.6	0.000395	.005320	.006002
1040A	.	.	.	.	.	.	.	.	.	.
1041A	.	.	.	.	.	.	.	.	.	.
1041B	.	.	.	.	.	.	.	.	.	.
1042A	.	.	.	.	.	.	.	.	.	.
1042B	.	.	.	.	.	.	.	.	.	.

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 75 CONFIGURATION I2PCF18
AIR DENSITY RATIO 1.0332 OAT 5.6 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1048A	923.2	69.800	241.0	.005720	.0004730	0.176	INTERACTION
1048B	918.7	69.244	242.4	.005624	.0004636	0.175	INTERACTION
1049A	331.7	23.225	241.5	.002047	.0001567	0.068	INTERACTION
1049B	330.8	23.078	241.0	.002050	.0001564	0.068	INTERACTION
1050A	547.2	36.459	242.4	.003350	.0002441	0.110	INTERACTION
1050B	558.1	36.645	243.8	.003378	.0002426	0.110	INTERACTION
1051A	767.5	54.618	242.0	.004714	.0003669	0.151	INTERACTION
1051B	766.8	55.142	240.5	.004768	.0003750	0.151	INTERACTION
1052A	898.9	67.604	243.1	.005574	.0004503	0.174	INTERACTION
1052B	906.0	67.866	242.2	.005555	.0004551	0.174	INTERACTION
1053A	780.6	56.543	242.8	.004762	.0003773	0.152	INTERACTION
1053B	792.5	56.777	242.2	.004859	.0003808	0.152	INTERACTION
1054A	552.1	37.549	242.2	.003386	.0002518	0.112	INTERACTION
1054B	550.8	37.342	242.1	.003380	.0002507	0.112	INTERACTION
1055A	333.8	23.252	242.2	.002047	.0001559	0.066	INTERACTION
1055B	330.5	23.293	242.2	.002027	.0001562	0.065	INTERACTION
1056A	1011.7	76.502	242.5	.006187	.0005117	0.188	ISOLATED
1056B	1019.9	77.051	243.4	.006195	.0005119	0.188	ISOLATED
1057A	941.3	68.738	242.7	.005747	.0004590	0.173	ISOLATED
1057B	910.6	66.785	243.1	.005545	.0004448	0.173	ISOLATED
1058A	786.9	54.404	242.5	.004813	.0003639	0.149	ISOLATED
1058B	782.2	53.942	242.7	.004776	.0003602	0.149	ISOLATED
1059A	567.0	36.352	241.9	.003486	.0002444	0.108	ISOLATED
1059B	557.5	36.126	243.4	.003386	.0002400	0.108	ISOLATED
1060A	329.1	22.760	243.0	.002006	.0001517	0.064	ISOLATED
1060B	336.7	22.926	242.8	.002054	.0001530	0.064	ISOLATED

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 75 CONFIGURATION 12PCF18 ARM= 1.088 M
AIR DENSITY RATIO 1.0332 OAT 5.6 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1048A	65.0	2.896	1307.0	.015318	.0043140	0.376	6.8	0.001603	.015167	.013715
1048B	66.7	2.978	1306.1	.015739	.0044433	0.375	6.1	0.001438	.015008	.014302
1049A	22.6	0.537	1309.7	.005290	.0007962	0.172	1.2	0.000271	.005006	.005019
1049B	22.9	0.546	1306.3	.005392	.0008139	0.172	1.2	0.000273	.005000	.005119
1050A	36.6	0.909	1306.5	.008630	.0013560	0.229	2.5	0.000587	.007897	.008043
1050B	35.0	1.885	1302.0	.008310	.0013281	0.230	2.6	0.000623	.007992	.007687
1051A	53.3	1.813	1306.4	.012575	.0027041	0.315	4.3	0.001017	.011832	.011558
1051B	52.8	1.770	1308.6	.012407	.0026312	0.314	3.9	0.000909	.011906	.011498
1052A	64.6	2.856	1307.5	.015212	.0042517	0.376	6.4	0.001508	.014620	.013704
1052B	66.7	2.953	1307.8	[illegible]	.0043942	0.375	5.5	0.001287	.014669	.014409
1053A	57.6	2.031	1306.8	.013583	.0030273	0.323	4.6	0.001090	.012241	.012493
1053B	57.7	2.069	1306.0	.013611	.0030869	0.323	4.1	0.000976	.012308	.012635
1054A	[illegible]	0.933	1306.5	.008630	.0013914	0.235	3.5	0.000828	.008133	.007602
1054B	[illegible]	0.983	1305.3	.009643	.0014681	0.234	2.9	0.000693	.008103	.008950
1055A	23.1	0.543	1305.6	.005460	.0008113	[illegible]	2.0	0.000462	.005043	.004998
1055B	21.9	0.536	1306.9	.005166	.0007980	0.165	2.3	0.000545	.005042	.004621
1056A	.	.	.	.	.	.	.	.	.	.
1056B	.	.	.	.	.	.	.	.	.	.
1057A	.	.	.	.	.	.	.	.	.	.
1057B	.	.	.	.	.	.	.	.	.	.
1058A	.	.	.	.	.	.	.	.	.	.
1058B	.	.	.	.	.	.	.	.	.	.
1059A	.	.	.	.	.	.	.	.	.	.
1059B	.	.	.	.	.	.	.	.	.	.
1060A	.	.	.	.	.	.	.	.	.	.
1060B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 76 CONFIGURATION 114PF18
AIR DENSITY RATIO 1.0078 OAT 12.8 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1068A	882.3	65.926	244.0	.005466	.0004467	0.175	INTERACTION
1068B	904.9	65.221	242.2	.005689	.0004553	0.175	INTERACTION
1069A	327.2	22.420	243.0	.002045	.0001532	0.070	INTERACTION
1069B	328.0	22.298	243.9	.002034	.0001512	0.070	INTERACTION
1070A	550.8	37.344	243.3	.003495	.0002546	0.118	INTERACTION
1070B	574.9	37.491	243.5	.003577	.0002551	0.118	INTERACTION
1071A	761.8	54.164	245.7	.004655	.0003620	0.156	INTERACTION
1071B	783.1	55.420	242.2	.004923	.0003810	0.157	INTERACTION
1072A	882.0	64.134	243.6	.005483	.0004360	0.174	INTERACTION
1072B	859.0	63.668	243.2	.005358	.0004344	0.174	INTERACTION
1073A	789.0	55.654	244.2	.004879	.0003764	0.154	INTERACTION
1073B	774.6	55.277	242.4	.004861	.0003794	0.155	INTERACTION
1075A	557.1	36.886	243.1	.003478	.0002519	0.115	INTERACTION
1075B	548.3	36.610	242.0	.003453	.0002522	0.115	INTERACTION
1076A	332.0	22.563	242.7	.002078	.0001545	0.070	INTERACTION
1076B	327.5	22.206	242.6	.002051	.0001522	0.070	INTERACTION
1078A	883.2	63.622	242.7	.005528	.0004356	0.171	ISOLATED
1078B	892.9	64.253	243.4	.005560	.0004376	0.171	ISOLATED
1079A	772.4	53.173	243.0	.004827	.0003634	0.150	ISOLATED
1079B	758.0	52.341	243.3	.004724	.0003568	0.150	ISOLATED
1080A	561.4	36.130	243.3	.003499	.0002463	0.112	ISOLATED
1080B	558.0	36.060	243.6	.003468	.0002452	0.112	ISOLATED
1081A	337.2	21.959	243.8	.002093	.0001490	0.066	ISOLATED
1081B	336.5	22.133	243.8	.002088	.0001502	0.066	ISOLATED

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 76 CONFIGURATION 114PF18 ARM= 1.088 M
AIR DENSITY RATIO 1.0078 OAT 12.8 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1068A	65.0	2.978	1305.6	.015726	.0045582	0.379	4.0	0.000980	.014658	.014747
1068B	63.9	2.887	1308.5	.015391	.0043990	0.378	4.0	0.000965	.014660	.014426
1069A	20.7	0.521	1304.0	.005018	.0007992	0.174	1.6	0.000378	.004998	.004640
1069B	21.9	0. 43	1304.7	.005314	.0008329	0.174	1.0	0.000248	.004965	.005066
1070A	38.6	0.981	1305.6	.009333	.0015009	0.249	2.0	0.000495	.008303	.008837
1070B	39.1	0.994	1306.3	.009442	.0015202	0.248	1.6	0.000387	.008328	.009055
1071A	56.1	2.000	1307.0	.013556	.0030543	0.329	2.9	0.000709	.012018	.012847
1071B	49.3	1.757	1312.2	.011818	.0026619	0.333	3.7	0.000895	.012199	.010923
1072A	64.0	2.860	1306.5	.015470	.0043710	0.385	4.8	0.001172	.014242	.014298
1072B	63.7	2.871	1308.9	.015349	.0043721	0.383	4.4	0.001060	.014086	.014288
1073A	50.8	1.805	1306.7	.012284	.0027588	0.316	3.5	0.000838	.012355	.011445
1073B	52.2	1.813	1306.5	.012621	.0027718	0.316	3.3	0.000796	.012275	.011825
1075A	40.5	0.993	1306.8	.009778	.0015173	0.248	2.4	0.000569	.008187	.009209
1075B	39.7	0.999	1305.2	.009608	.0015296	0.248	2.2	0.000539	.008145	.009069
1076A	19.7	0.516	1309.2	.004743	.0007860	0.169	1.5	0.000353	.004990	.004389
1076B	21.5	0.531	1309.2	.005182	.0008083	0.169	1.4	0.000332	.004911	.004850
1078A	.	.	.	.	.	.	.	.	.	.
1078B	.	.	.	.	.	.	.	.	.	.
1079A	.	.	.	.	.	.	.	.	.	.
1079B	.	.	.	.	.	.	.	.	.	.
1080A	.	.	.	.	.	.	.	.	.	.
1080B	.	.	.	.	.	.	.	.	.	.
1081A	.	.	.	.	.	.	.	.	.	.
1081B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 77 CONFIGURATION 115PF18
AIR DENSITY RATIO 1.0729 OAT 3.3 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1087A	961.8	74.255	240.9	.005744	.0004850	0.188	INTERACTION
1087B	988.3	76.002	241.9	.005851	.0004921	0.188	INTERACTION
1088A	330.1	23.199	240.5	.001977	.0001519	0.071	INTERACTION
1088B	335.5	23.516	240.3	.002012	.0001543	0.071	INTERACTION
1089A	554.8	37.018	242.3	.003273	.0002389	0.113	INTERACTION
1089B	551.7	37.196	241.0	.003292	.0002427	0.113	INTERACTION
1090A	777.4	55.018	241.1	.004634	.0003567	0.150	INTERACTION
1090B	761.4	54.861	240.6	.004674	.0003590	0.150	INTERACTION
1091A	988.1	75.413	241.0	.005896	.0004921	0.187	INTERACTION
1091B	992.4	75.335	240.9	.005926	.0004921	0.187	INTERACTION
1092A	783.6	55.565	241.5	.004655	.0003612	0.152	INTERACTION
1092B	774.4	55.494	240.4	.004641	.0003637	0.152	INTERACTION
1093A	797.8	57.880	242.0	.004719	.0003745	0.156	INTERACTION
1093B	800.5	56.160	241.2	.004768	.0003789	0.157	INTERACTION
1094A	543.7	36.565	241.5	.003230	.0002376	0.113	INTERACTION
1094B	548.6	36.591	241.5	.003259	.0002378	0.113	INTERACTION
1095A	335.8	23.302	241.2	.002000	.0001518	0.072	INTERACTION
1095B	336.6	23.207	241.0	.002009	.0001514	0.072	INTERACTION
1096A	1016.2	77.268	241.5	.006037	.0005021	0.189	ISOLATED
1096B	1019.0	77.037	241.8	.006038	.0004993	0.190	ISOLATED
1097A	796.0	55.623	242.1	.004704	.0003595	0.153	ISOLATED
1097B	801.7	55.642	240.6	.004796	.0003641	0.153	ISOLATED
1098A	571.1	36.586	241.1	.003405	.0002386	0.113	ISOLATED
1098B	568.2	36.978	241.3	.003382	.0002407	0.113	ISOLATED
1099A	329.8	22.901	243.6	.001923	.0001460	0.069	ISOLATED
1099B	334.8	23.022	242.4	.001974	.0001484	0.069	ISOLATED

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 77 CONFIGURATION 11SPF18 ARM= 1.167 M
AIR DENSITY RATIO 1.0729 OAT 3.3 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1087A	68.1	3.211	1306.9	.015440	.0046073	0.382	2.0	0.000444	.014431	.014996
1087B	69.6	3.247	1308.1	.015616	.0046510	0.362	2.7	0.000604	.014745	.015211
1088A	24.0	0.565	1305.1	.005464	.0008128	0.154	0.3	0.000071	.004521	.005394
1088B	22.6	0.552	1304.9	.005163	.0007952	0.154	0.8	0.000182	.004584	.005000
1089A	34.2	0.832	1300.6	.007846	.0012047	0.217	1.1	0.000255	.007264	.007591
1089B	36.5	0.871	1307.3	.008270	.0012491	0.216	1.3	0.000303	.007224	.007967
1090A	50.6	1.653	1303.7	.011531	.0023836	0.296	2.2	0.000497	.010746	.011034
1090B	52.1	1.697	1309.2	.011786	.0024264	0.296	1.2	0.000272	.010625	.011514
1091A	68.6	3.168	1306.2	.015579	.0045506	0.378	3.4	0.000768	.014673	.014811
1091B	65.5	3.050	1307.3	.015067	.0043743	0.378	3.3	0.000746	.014632	.014321
1092A	55.4	1.901	1304.8	.012615	.0027372	0.308	2.0	0.000466	.010837	.012149
1092B	57.2	1.840	1307.3	.012959	.0026392	0.307	2.6	0.000595	.010778	.012364
1093A	54.0	1.671	1301.9	.012336	.0024162	0.297	3.3	0.000763	.011336	.011573
1093B	55.5	1.689	1304.5	.012641	.0024326	0.297	4.0	0.000901	.011345	.011739
1094A	33.1	0.912	1304.3	.008683	.0013135	0.219	1.6	0.000375	.007135	.008306
1094B	35.3	0.895	1305.0	.008269	.0012877	0.218	1.6	0.000354	.007132	.007914
1095A	23.2	0.578	1306.4	.005262	.0008307	0.160	0.8	0.000172	.004532	.005090
1095B	22.6	0.571	1305.3	.005149	.0008207	0.160	1.0	0.000233	.004521	.004916
1096A	.	.	.	.	.	.	.	.	.	.
1096B	.	.	.	.	.	.	.	.	.	.
1097A	.	.	.	.	.	.	.	.	.	.
1097B	.	.	.	.	.	.	.	.	.	.
1098A	.	.	.	.	.	.	.	.	.	.
1098B	.	.	.	.	.	.	.	.	.	.
1099A	.	.	.	.	.	.	.	.	.	.
1099B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 78 CONFIGURATION 116PF18
AIR DENSITY RATIO 1.0499 OAT 3.3 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1107A	999.4	76.180	242.4	.006020	.0005019	0.187	INTERACTION
1107B	1006.8	76.434	242.6	.006055	.0005027	0.187	INTERACTION
1108A	329.4	23.546	240.9	.002010	.0001572	0.067	INTERACTION
1108B	324.7	23.477	241.3	.001975	.0001562	0.067	INTERACTION
1109A	559.7	38.074	241.5	.003398	.0002528	0.114	INTERACTION
1109B	556.9	37.919	241.3	.003387	.0002522	0.114	INTERACTION
1110A	770.2	54.879	241.2	.004688	.0003653	0.150	INTERACTION
1110B	788.0	55.243	241.7	.004776	.0003662	0.151	INTERACTION
1111A	1024.6	78.685	242.2	.006182	.0005193	0.191	INTERACTION
1111B	993.7	77.176	242.6	.005976	.0005076	0.191	INTERACTION
1112A	781.4	54.959	241.5	.004744	.0003649	0.151	INTERACTION
1112B	774.2	54.879	240.4	.004741	.0003676	0.151	INTERACTION
1113A	554.6	36.879	241.6	.003364	.0002447	0.111	INTERACTION
1113B	549.1	36.603	241.6	.003331	.0002428	0.111	INTERACTION
1114A	342.3	23.600	240.5	.002094	.0001579	0.067	INTERACTION
1114B	335.5	23.538	242.5	.002019	.0001549	0.067	INTERACTION
1115A	977.5	73.540	242.0	.005909	.0004862	0.185	ISOLATED
1115B	1002.6	74.637	242.0	.006060	.0004934	0.185	ISOLATED
1116A	791.1	55.422	241.4	.004807	.0003683	0.151	ISOLATED
1116B	789.1	55.075	244.4	.004676	.0003570	0.151	ISOLATED
1117A	571.2	36.881	241.4	.003471	.0002451	0.111	ISOLATED
1117B	564.9	36.787	241.4	.003432	.0002445	0.111	ISOLATED
1118A	340.8	23.225	241.9	.002062	.0001537	0.068	ISOLATED
1118B	340.4	23.347	242.0	.002058	.0001544	0.068	ISOLATED

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 78 CONFIGURATION 116PF18 ARM= 1.167 M
AIR DENSITY RATIO 1.0499 OAT 3.3 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1107A	67.4	3.065	1308.3	.015691	.0044852	0.381	4.0	0.000937	.015098	.014655
1107B	69.3	3.162	1311.9	.015944	.0046016	0.379	2.3	0.000532	.015064	.015412
1108A	21.4	0.497	1307.8	.004943	.0007279	0.164	0.8	0.000196	.004670	.004747
1108B	20.8	0.506	1304.9	.004631	.0007445	0.164	1.0	0.000238	.004677	.004593
1109A	34.6	0.841	1304.9	.008048	.0012363	0.224	1.0	0.000238	.007585	.007610
1109B	34.5	0.839	1306.7	.008005	.0012313	0.223	1.3	0.000309	.007533	.007696
1110A	50.4	1.462	1304.7	.011724	.0021510	0.294	3.1	0.000714	.010936	.011010
1110B	52.5	1.490	1305.5	.012205	.0021897	0.294	2.6	0.000599	.010994	.011605
1111A	68.9	3.176	1311.3	.015678	.0046257	0.383	3.7	0.000850	.015523	.015027
1111B	72.7	3.262	1306.6	.016859	.0047851	0.383	3.2	0.000733	.015335	.016126
1112A	51.4	1.299	1306.4	.011931	.0019067	0.279	2.4	0.000547	.010924	.011364
1112B	51.9	1.457	1308.4	.012008	.0021323	0.279	2.1	0.000484	.010875	.011524
1113A	33.2	0.816	1305.5	.007720	.0011986	0.218	2.0	0.000465	.007340	.007255
1113B	31.9	0.799	1306.2	.007402	.0011726	0.218	1.9	0.000434	.007278	.006969
1114A	22.3	0.519	1304.0	.005190	.0007638	0.158	1.4	0.000331	.004708	.004858
1114B	21.7	0.504	1306.5	.005025	.0007394	0.158	1.1	0.000248	.004678	.004778
1115A	.	.	.	.	.	.	.	.	.	.
1115B	.	.	.	.	.	.	.	.	.	.
1116A	.	.	.	.	.	.	.	.	.	.
1116B	.	.	.	.	.	.	.	.	.	.
1117A	.	.	.	.	.	.	.	.	.	.
1117B	.	.	.	.	.	.	.	.	.	.
1118A	.	.	.	.	.	.	.	.	.	.
1118B	.	.	.	.	.	.	.	.	.	.

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 79 CONFIGURATION 117PF18
AIR DENSITY RATIO 1.0527 DAT 2.8 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1122A	953.0	74.696	242.0	.005746	.0004925	0.187	INTERACTION
1122B	964.4	74.902	243.0	.005769	.0004901	0.187	INTERACTION
1123A	319.8	23.180	241.2	.001941	.0001539	0.066	INTERACTION
1123B	309.3	22.728	242.4	.001858	.0001493	0.066	INTERACTION
1124A	542.5	37.066	241.8	.003276	.0002448	0.113	INTERACTION
1124B	556.8	37.819	243.1	.003328	.0002472	0.113	INTERACTION
1125A	775.2	55.767	243.1	.004633	.0003646	0.153	INTERACTION
1125B	760.7	55.004	241.0	.004626	.0003658	0.153	INTERACTION
1126A	957.3	72.032	242.4	.005752	.0004733	0.183	INTERACTION
1126B	983.9	73.728	242.1	.005927	.0004857	0.183	INTERACTION
1127A	997.2	74.104	242.4	.005991	.0004869	0.183	INTERACTION
1128A	775.9	55.825	242.1	.004673	.0003678	0.153	INTERACTION
1128B	777.2	55.636	242.3	.004673	.0003659	0.153	INTERACTION
1129A	552.9	37.394	241.5	.003348	.0002476	0.113	INTERACTION
1129B	540.7	37.416	241.5	.003274	.0002478	0.113	INTERACTION
1130A	319.5	23.084	242.4	.001920	.0001517	0.066	INTERACTION
1130B	321.9	23.665	242.4	.001934	.0001555	0.066	INTERACTION
1131A	990.3	75.196	240.3	.006054	.0005028	0.188	ISOLATED
1131B	1007.2	75.567	244.8	.005933	.0004868	0.188	ISOLATED
1132A	781.2	55.074	242.1	.004705	.0003623	0.152	ISOLATED
1132B	771.4	54.577	242.7	.004623	.0003577	0.152	ISOLATED
1133A	557.8	35.847	242.4	.003351	.0002356	0.109	ISOLATED
1133B	557.6	36.009	242.8	.003339	.0002358	0.109	ISOLATED
1134A	333.6	22.776	242.1	.002009	.0001500	0.065	ISOLATED
1134B	335.9	22.980	244.4	.001985	.0001486	0.065	ISOLATED

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 79 CONFIGURATION I17PF18 ARM= 1.088 M
AIR DENSITY RATIO 1.0527 OAT 2.8 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1122A	69.2	3.047	1308.5	.015955	.0044455	0.376	3.9	0.000893	.015831	.015062
1122B	71.7	3.178	1304.2	.016659	.0046673	0.375	4.4	0.001022	.015980	.015637
1123A	23.0	0.573	1307.8	.005320	.0008365	0.168	1.3	0.000308	.004918	.005012
1123B	22.9	0.562	1301.5	.005341	.0008281	0.169	1.1	0.000249	.004869	.005092
1124A	37.2	0.881	1305.0	.008634	.0012925	0.224	1.5	0.000340	.007698	.008293
1124B	36.9	0.864	1307.0	.008525	.0012638	0.224	2.0	0.000473	.008033	.008052
1125A	53.1	1.575	1305.8	.012302	.0023073	0.297	2.8	0.000659	.011869	.011643
1125B	53.4	1.644	1305.4	.012380	.0024095	0.297	3.1	0.000722	.011712	.011659
1126A	67.9	3.053	1307.4	.015693	.0044609	0.379	3.7	0.000853	.015291	.014840
1126B	64.3	2.941	1311.6	.014766	.0042700	0.379	4.3	0.000980	.015551	.013785
1127A	72.8	3.069	1310.3	.016741	.0044646	0.378	4.3	0.000993	.015663	.015748
1128A	54.0	1.666	1307.1	.012472	.0024363	0.300	3.2	0.000751	.011856	.011721
1128B	53.7	1.686	1307.2	.012408	.0024640	0.300	2.8	0.000648	.011814	.011761
1129A	37.9	0.905	1306.0	.008776	.0013254	0.227	1.9	0.000433	.007956	.008343
1129B	35.0	0.880	1305.5	.008111	.0012898	0.227	2.5	0.000577	.007966	.007534
1130A	22.5	0.545	1306.3	.005199	.0007972	0.163	1.4	0.000329	.004909	.004870
1130B	22.8	0.524	1307.2	.005274	.0007663	0.164	1.2	0.000278	.005025	.004996
1131A	.	.	.	.	.	.	.	.	.	.
1131B	.	.	.	.	.	.	.	.	.	.
1132A	.	.	.	.	.	.	.	.	.	.
1132B	.	.	.	.	.	.	.	.	.	.
1133A	.	.	.	.	.	.	.	.	.	.
1133B	.	.	.	.	.	.	.	.	.	.
1134A	.	.	.	.	.	.	.	.	.	.
1134B	.	.	.	.	.	.	.	.	.	.

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 80 CONFIGURATION T17PCF18 ARM= 1.088 M
AIR DENSITY RATIO 1.0506 OAT 3.3 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET
1138A	71.8	3.264	1308.0	.016607	.0047753	0.380	3.6	0.000833	.015773
1138B	70.5	3.261	1306.3	.016361	.0047826	0.380	4.3	0.000990	.015370
1139A	17.0	0.469	1305.4	.003946	.0006886	0.146	0.6	0.000134	.003611
1139B	15.9	0.461	1305.8	.003686	.0006767	0.146	1.1	0.000248	.003438
1140A	36.9	0.925	1305.6	.008570	.0013585	0.236	1.6	0.000361	.008209
1140B	37.1	0.957	1304.8	.008633	.0014068	0.235	1.6	0.000362	.008271
1141A	43.1	1.180	1305.3	.010021	.0017326	0.272	2.6	0.000599	.009422
1141B	44.6	1.211	1304.8	.010360	.0017805	0.272	1.8	0.000424	.009936
1142A	52.8	1.691	1306.0	.012261	.0024820	0.307	2.8	0.000661	.011600
1142B	54.3	1.749	1305.0	.012609	.0025702	0.307	2.4	0.000558	.012051
1143A	63.3	2.465	1306.2	.014692	.0036165	0.343	3.2	0.000733	.013959
1143B	61.8	2.378	1307.3	.014306	.0034827	0.343	3.2	0.000731	.013574
1144A	70.1	3.075	1307.1	.016247	.0045050	0.381	3.9	0.000896	.015351
1144B	70.6	3.140	1306.7	.016371	.0046023	0.381	3.8	0.000876	.015495
1145A	61.2	2.326	1308.4	.014149	.0034012	0.335	3.4	0.000781	.013368
1145B	62.0	2.269	1308.9	.014323	.0033143	0.335	3.2	0.000729	.013593
1146A	54.5	1.751	1305.6	.012659	.0025711	0.301	2.8	0.000640	.012019
1146B	52.8	1.642	1305.9	.012263	.0024094	0.301	2.3	0.000537	.011726
1147A	43.2	1.106	1305.4	.010040	.0016244	0.253	1.9	0.000444	.009596
1147B	42.7	1.119	1305.0	.009933	.0016438	0.253	1.9	0.000434	.009498
1148A	35.2	0.914	1305.0	.008166	.0013432	0.228	1.9	0.000434	.007752
1148B	35.9	0.915	1305.1	.008329	.0013447	0.228	1.8	0.000424	.007905
1149A	17.9	0.452	1306.3	.004157	.0006629	0.127	0.8	0.000175	.003982
1149B	17.1	0.435	1306.1	.003973	.0006382	0.128	0.9	0.000206	.003766

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 81 CONFIGURATION 117PF39
AIR DENSITY RATIO 1.0436 OAT 5.0 DEG C

. MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1155A	923.6	70.957	243.2	.005563	.0004675	0.176	INTERACTION
1155B	911.5	69.642	242.4	.005525	.0004616	0.178	INTERACTION
1156A	321.4	22.991	242.4	.001948	.0001524	0.065	INTERACTION
1156B	324.0	22.999	241.2	.001984	.0001540	0.065	INTERACTION
1157A	545.9	36.864	241.6	.003332	.0002460	0.111	INTERACTION
1157B	537.5	36.651	241.6	.003280	.0002446	0.111	INTERACTION
1158A	771.1	55.055	242.8	.004657	.0003637	0.151	INTERACTION
1158B	789.9	55.212	242.3	.004791	.0003663	0.151	INTERACTION
1159A	928.9	71.861	241.7	.005663	.0004792	0.181	INTERACTION
1159B	946.4	71.165	242.3	.005753	.0004721	0.180	INTERACTION
1160A	951.7	71.371	242.1	.005782	.0004743	0.180	INTERACTION
1160B	955.1	71.968	241.8	.005818	.0004795	0.180	INTERACTION
1161A	787.4	56.388	241.6	.004805	.0003764	0.152	INTERACTION
1161B	795.9	56.820	242.0	.004840	.0003779	0.152	INTERACTION
1162A	551.2	37.703	240.6	.003390	.0002536	0.112	INTERACTION
1162B	553.3	37.482	243.7	.003319	.0002459	0.112	INTERACTION
1163A	322.4	23.024	242.0	.001961	.0001531	0.065	INTERACTION
1163B	324.2	23.189	241.6	.001978	.0001548	0.064	INTERACTION
1164A	982.7	75.055	242.1	.005971	.0004988	0.189	ISOLATED
1164B	1007.3	76.172	242.1	.006120	.0005062	0.189	ISOLATED
1165A	920.2	67.978	243.8	.005515	.0004456	0.177	ISOLATED
1165B	940.4	69.119	242.4	.005699	.0004581	0.177	ISOLATED
1166A	777.0	53.838	241.5	.004746	.0003596	0.148	ISOLATED
1166B	753.6	53.024	242.0	.004583	.0003527	0.148	ISOLATED
1167A	556.8	36.594	242.3	.003389	.0002428	0.111	ISOLATED
1167B	561.0	36.850	241.9	.003415	.0002453	0.111	ISOLATED
1168A	321.2	22.610	242.0	.001953	.0001504	0.062	ISOLATED
1168B	326.5	22.812	242.5	.001977	.0001511	0.062	ISOLATED

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 81 CONFIGURATION I17PF39 ARM= 1.088 M
AIR DENSITY RATIO 1.0436 OAT 5.0 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1155A	70.4	3.139	1308.2	.016392	.0046211	0.379	6.3	0.001470	.015177	.014922
1155B	71.4	3.087	1311.3	.016551	.0045229	0.379	7.1	0.001639	.014825	.014912
1156A	22.5	0.490	1311.2	.005215	.0007186	0.163	2.1	0.000495	.004895	.004721
1156B	23.3	0.515	1304.5	.005457	.0007628	0.163	1.9	0.000437	.004947	.005019
1157A	39.1	0.889	1306.2	.009119	.0013131	0.229	4.0	0.000924	.007909	.008195
1157B	38.5	0.888	1306.0	.008998	.0013119	0.229	3.2	0.000738	.007866	.008260
1158A	57.7	1.758	1305.8	.013490	.0025979	0.308	5.4	0.001268	.011819	.012222
1158B	51.7	1.677	1307.0	.012064	.0024729	0.308	4.9	0.001151	.011830	.010913
1159A	70.6	3.049	1309.0	.016423	.0044840	0.377	9.3	0.002151	.015351	.014272
1159B	66.6	2.907	1312.1	.015408	.0042542	0.377	6.5	0.001513	.015130	.013895
1160A	66.3	2.900	1307.7	.015449	.0042729	0.373	6.6	0.001534	.015275	.013916
1160B	66.6	2.876	1310.3	.015452	.0042217	0.372	7.9	0.001837	.015344	.013615
1161A	55.9	1.565	1306.7	.013035	.0023091	0.295	6.0	0.001391	.012088	.011644
1161B	57.0	1.598	1305.1	.013327	.0023631	0.295	6.6	0.001540	.012210	.011787
1162A	37.0	0.807	1306.0	.008634	.0011917	0.217	3.8	0.000883	.008092	.007751
1162B	36.4	0.824	1302.8	.008540	.0012226	0.217	3.7	0.000877	.008083	.007663
1163A	22.1	0.498	1305.5	.005157	.0007365	0.166	2.0	0.000457	.004944	.004699
1163B	21.4	0.491	1307.3	.004977	.0007245	0.166	2.8	0.000643	.004966	.004334
1164A	.	.	.	.	.	.	.	.	.	.
1164B	.	.	.	.	.	.	.	.	.	.
1165A	.	.	.	.	.	.	.	.	.	.
1165B	.	.	.	.	.	.	.	.	.	.
1166A	.	.	.	.	.	.	.	.	.	.
1166B	.	.	.	.	.	.	.	.	.	.
1167A	.	.	.	.	.	.	.	.	.	.
1167B	.	.	.	.	.	.	.	.	.	.
1168A	.	.	.	.	.	.	.	.	.	.
1168B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 82 CONFIGURATION I18PF39
AIR DENSITY RATIO 1.0276 OAT 10.6 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1172A	919.8	67.497	242.4	.005661	.0004544	0.176	INTERACTION
1172B	912.9	67.015	242.6	.005609	.0004503	0.176	INTERACTION
1173A	339.5	22.746	240.5	.002122	.0001555	0.068	INTERACTION
1173B	337.1	22.699	241.8	.002086	.0001536	0.068	INTERACTION
1174A	563.1	36.397	243.1	.003448	.0002437	0.112	INTERACTION
1174B	567.5	36.547	242.1	.003502	.0002467	0.112	INTERACTION
1175A	781.5	54.126	242.2	.004818	.0003650	0.151	INTERACTION
1175B	776.6	53.965	241.9	.004800	.0003648	1.722	INTERACTION
1176A	905.3	66.524	242.3	.005577	.0004482	0.174	INTERACTION
1176B	901.1	66.158	241.5	.005589	.0004488	0.175	INTERACTION
1177A	779.6	54.112	241.6	.004831	.0003668	0.151	INTERACTION
1177B	777.4	53.930	241.8	.004809	.0003649	0.151	INTERACTION
1178A	560.2	36.130	241.5	.003475	.0002451	0.110	INTERACTION
1178B	558.3	36.139	242.3	.003439	.0002435	0.110	INTERACTION
1179A	337.3	22.499	241.7	.002089	.0001524	0.066	INTERACTION
1179B	335.4	22.511	242.8	.002057	.0001510	0.066	INTERACTION
1180A	1004.9	74.988	242.3	.006190	.0005052	0.188	ISOLATED
1180B	1001.9	75.026	242.4	.006166	.0005050	0.188	ISOLATED
1181A	918.0	65.968	242.0	.005669	.0004456	0.174	ISOLATED
1181B	926.3	66.465	241.6	.005731	.0004497	0.174	ISOLATED
1182A	787.0	53.469	243.0	.004823	.0003585	0.148	ISOLATED
1182B	787.8	53.774	242.5	.004844	.0003617	0.148	ISOLATED
1183A	560.8	35.515	241.2	.003488	.0002416	0.110	ISOLATED
1183B	562.0	35.625	241.3	.003492	.0002421	0.110	ISOLATED
1184A	332.3	21.979	243.7	.002024	.0001464	0.065	ISOLATED
1184B	331.5	22.153	243.2	.002028	.0001482	0.065	ISOLATED

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 82 CONFIGURATION 118PF39 ARM= 1.088 M
AIR DENSITY RATIO 1.0276 OAT 10.6 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1172A	66.9	2.921	1305.6	.015903	.0043881	0.379	7.7	0.001839	.014733	.014065
1172B	65.7	2.874	1305.9	.015598	.0043129	0.378	7.8	0.001847	.014609	.013751
1173A	22.2	0.520	1300.8	.005296	.0007859	0.171	2.3	0.000542	.004997	.004754
1173B	22.2	0.525	1304.3	.005289	.0007902	0.171	2.1	0.000497	.004960	.004792
1174A	36.3	0.909	1307.1	.008595	.0013621	0.235	3.6	0.000853	.007919	.007742
1174B	36.5	0.895	1305.3	.008671	.0013438	0.235	3.8	0.000898	.007973	.007774
1175A	53.7	1.773	1306.4	.012738	.0026579	0.319	5.5	0.001308	.011790	.011431
1175B	54.6	1.813	1305.5	.012966	.0027223	0.319	5.1	0.001214	.011770	.011752
1176A	66.5	2.922	1306.2	.015780	.0043620	0.377	7.4	0.001751	.014495	.014029
1176B	66.4	2.891	1306.0	.015754	.0043377	0.376	8.1	0.001920	.014419	.013833
1177A	55.4	1.859	1302.8	.013200	.0028019	0.319	6.0	0.001421	.011851	.011780
1177B	54.8	1.844	1307.3	.012962	.0027606	0.319	5.9	0.001400	.011730	.011562
1178A	36.9	0.897	1307.8	.008733	.0013420	0.233	4.2	0.000989	.007852	.007744
1178B	37.4	0.920	1304.6	.008892	.0013827	0.233	3.5	0.000825	.007893	.008068
1179A	21.8	0.524	1308.6	.005160	.0007834	0.166	2.7	0.000641	.004884	.004519
1179B	22.4	0.513	1305.8	.005309	.0007698	0.166	2.6	0.000623	.004908	.004686
1180A	.	.	.	.	.	.	.	.	.	.
1180B	.	.	.	.	.	.	.	.	.	.
1181A	.	.	.	.	.	.	.	.	.	.
1181B	.	.	.	.	.	.	.	.	.	.
1182A	.	.	.	.	.	.	.	.	.	.
1182B	.	.	.	.	.	.	.	.	.	.
1183A	.	.	.	.	.	.	.	.	.	.
1183B	.	.	.	.	.	.	.	.	.	.
1184A	.	.	.	.	.	.	.	.	.	.
1184B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 83 CONFIGURATION 119PF39
AIR DENSITY RATIO 1.0140 OAT 14.4 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1190A	904.2	66.829	242.0	.005659	.0004575	0.176	INTERACTION
1190B	905.9	66.955	241.7	.005684	.0004595	0.176	INTERACTION
1191A	323.0	22.005	242.3	.002020	.0001502	0.066	INTERACTION
1191B	315.5	21.789	241.8	.001984	.0001494	0.065	INTERACTION
1192A	539.8	35.045	241.8	.003384	.0002403	0.110	INTERACTION
1192B	536.3	35.285	242.5	.003342	.0002405	0.110	INTERACTION
1193A	762.6	52.932	242.5	.004752	.0003608	0.150	INTERACTION
1193B	767.2	52.986	243.6	.004740	.0003580	0.150	INTERACTION
1194A	932.7	68.444	242.7	.005802	.0004657	0.177	INTERACTION
1194B	932.0	68.745	243.7	.005758	.0004641	0.177	INTERACTION
1195A	766.3	53.078	242.5	.004775	.0003618	0.150	INTERACTION
1195B	767.7	53.000	243.5	.004747	.0003584	0.150	INTERACTION
1196A	542.5	35.376	242.0	.003396	.0002422	0.111	INTERACTION
1196B	545.7	35.272	243.7	.003369	.0002381	0.111	INTERACTION
1197A	314.4	21.379	241.3	.001980	.0001472	0.064	INTERACTION
1197B	322.9	21.622	241.1	.002037	.0001492	0.065	INTERACTION
1198A	986.3	74.154	243.4	.006104	.0005020	0.189	ISOLATED
1198B	989.4	74.130	243.7	.006108	.0005005	0.190	ISOLATED
1199A	905.8	65.314	243.1	.005620	.0004433	0.174	ISOLATED
1199B	887.3	64.469	241.8	.005563	.0004421	0.174	ISOLATED
1200A	757.1	51.911	243.3	.004690	.0003517	0.149	ISOLATED
1200B	757.7	52.000	243.4	.004689	.0003520	0.149	ISOLATED
1201A	550.7	35.128	242.1	.003443	.0002403	0.111	ISOLATED
1201B	555.5	35.192	244.0	.003420	.0002370	0.110	ISOLATED
1202A	320.2	21.404	243.9	.001973	.0001443	0.063	ISOLATED
1202B	323.9	21.592	241.9	.002029	.0001479	0.063	ISOLATED

ORIGINAL PAGE IS OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 83 CONFIGURATION 119PF39 ARM= 1.167 M
AIR DENSITY RATIO 1.0140 OAT 14.4 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1190A	65.1	2.817	1304.2	.015687	.0042942	0.376	7.3	0.001758	.013800	.013928
1190B	65.2	2.793	1312.4	.015513	.0042052	0.374	6.8	0.001620	.013654	.013893
1191A	20.5	0.484	1306.8	.004923	.0007343	0.164	1.5	0.000363	.004526	.004560
1191B	20.5	0.481	1305.0	.004937	.0007328	0.164	1.6	0.000375	.004494	.004562
1192A	33.9	0.820	1308.1	.008122	.0012431	0.225	3.0	0.000714	.007194	.007408
1192B	34.1	0.833	1301.6	.008246	.0012746	0.225	2.5	0.000603	.007315	.007644
1193A	50.0	1.482	1305.6	.012036	.0022548	0.301	4.7	0.001134	.010906	.010902
1193B	51.8	1.535	1307.2	.012434	.0023300	0.300	6.4	0.001537	.010891	.010897
1194A	66.3	2.846	1307.2	.015913	.0043188	0.376	6.4	0.001537	.014068	.014376
1194B	64.8	2.784	1306.9	.015558	.0042266	0.375	7.1	0.001708	.014136	.013849
1195A	49.7	1.477	1309.1	.011898	.0022344	0.297	5.4	0.001298	.010878	.010599
1195B	50.7	1.509	1307.0	.012160	.0022913	0.297	4.7	0.001132	.010897	.011028
1196A	35.0	0.817	1308.6	.008382	.0012370	0.219	2.7	0.000650	.007256	.007732
1196B	34.7	0.813	1301.8	.008405	.0012448	0.219	2.6	0.000635	.007311	.007770
1197A	20.7	0.487	1305.9	.004973	.0007405	0.157	1.7	0.000417	.004403	.004556
1197B	19.3	0.462	1307.0	.004633	.0007015	0.158	2.0	0.000480	.004446	.004153
1198A	.	.	.	.	.	.	.	.	.	.
1198B	.	.	.	.	.	.	.	.	.	.
1199A	.	.	.	.	.	.	.	.	.	.
1199B	.	.	.	.	.	.	.	.	.	.
1200A	.	.	.	.	.	.	.	.	.	.
1200B	.	.	.	.	.	.	.	.	.	.
1201A	.	.	.	.	.	.	.	.	.	.
1201B	.	.	.	.	.	.	.	.	.	.
1202A	.	.	.	.	.	.	.	.	.	.
1202B	.	.	.	.	.	.	.	.	.	.

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 84 CONFIGURATION I2PF18
AIR DENSITY RATIO 1.0117 OAT 15.0 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1206A	878.7	65.403	241.7	.005527	.0004499	0.173	INTERACTION
1206B	867.1	65.491	244.7	.005444	.0004394	0.173	INTERACTION
1207A	327.3	22.196	242.4	.002046	.0001518	0.069	INTERACTION
1207B	325.3	22.232	241.9	.002045	.0001527	0.068	INTERACTION
1208A	564.3	36.548	243.8	.003491	.0002471	0.112	INTERACTION
1208B	558.3	36.425	241.9	.003505	.0002501	0.112	INTERACTION
1209A	775.5	54.348	242.6	.004844	.0003713	0.153	INTERACTION
1209B	790.1	54.295	242.8	.004922	.0003699	0.153	INTERACTION
1210A	867.0	63.694	242.8	.005402	.0004340	0.169	INTERACTION
1210B	870.7	63.947	243.6	.005392	.0004331	0.169	INTERACTION
1211A	780.9	55.090	243.9	.004823	.0003722	0.153	INTERACTION
1211B	777.1	55.094	243.6	.004812	.0003731	0.153	INTERACTION
1212A	555.5	36.626	241.6	.003497	.0002522	0.113	INTERACTION
1212B	565.2	37.029	241.0	.003576	.0002563	0.113	INTERACTION
1213A	345.3	23.083	241.9	.002171	.0001585	0.072	INTERACTION
1213B	348.6	23.163	242.8	.002172	.0001580	0.072	INTERACTION
1214A	1010.3	75.602	242.4	.006316	.0005169	0.192	ISOLATED
1214B	1005.9	75.296	243.3	.006245	.0005113	0.191	ISOLATED
1215A	866.7	61.901	242.8	.005412	.0004218	0.168	ISOLATED
1215B	869.8	62.047	242.6	.005419	.0004228	0.168	ISOLATED
1216A	760.3	53.719	242.8	.004861	.0003660	0.151	ISOLATED
1217A	549.9	35.218	244.1	.003390	.0002375	0.110	ISOLATED
1217B	553.2	35.303	244.5	.003399	.0002373	0.110	ISOLATED
1218A	340.3	22.302	241.8	.002142	.0001533	0.068	ISOLATED
1218B	341.3	22.379	242.3	.002136	.0001531	0.068	ISOLATED

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 84 CONFIGURATION 12PF18 ARM= 1.068 M
AIR DENSITY RATIO 1.0117 OAT 15.0 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1206A	63.2	2.766	1309.7	.015131	.0041905	0.373	5.3	0.001268	.014396	.013663
1206B	61.7	2.710	1301.7	.014963	.0041577	0.373	5.0	0.001219	.014594	.013744
1207A	21.1	0.508	1306.4	.005088	.0007743	0.159	0.7	0.000161	.004911	.004927
1207B	20.5	0.495	1305.5	.004933	.0007546	0.159	1.2	0.000279	.004925	.004654
1208A	34.5	0.854	1311.1	.008252	.0012914	0.230	1.5	0.000362	.008028	.007690
1208B	34.1	0.870	1312.7	.008137	.0013122	0.230	2.0	0.000467	.007982	.007670
1209A	53.3	1.852	1307.5	.012819	.0028151	0.324	3.9	0.000930	.012003	.011889
1209B	53.1	1.836	1306.3	.012780	.0027964	0.324	3.4	0.000825	.012014	.011955
1210A	60.4	2.620	1308.2	.014516	.0039792	0.370	5.0	0.001196	.014053	.013320
1210B	61.3	2.663	1306.3	.014772	.0040561	0.369	4.8	0.001157	.014150	.013615
1211A	54.9	1.993	1306.9	.013206	.0030327	0.327	3.7	0.000899	.012178	.012307
1211B	56.0	1.991	1306.6	.013470	.0030307	0.327	3.6	0.000878	.012185	.012592
1212A	34.9	0.898	1305.3	.008411	.0013701	0.232	2.3	0.000547	.008116	.007863
1212B	34.3	0.899	1308.1	.008237	.0013661	0.231	1.3	0.000320	.008171	.007916
1213A	22.2	0.558	1305.6	.005351	.0008509	0.176	1.3	0.000322	.005113	.005029
1213B	23.1	0.562	1305.8	.005564	.0008560	0.176	1.1	0.000257	.005134	.005307
1214A	.	.	.	.	.	.	.	.	.	.
1214B	.	.	.	.	.	.	.	.	.	.
1215A	.	.	.	.	.	.	.	.	.	.
1215B	.	.	.	.	.	.	.	.	.	.
1216A	.	.	.	.	.	.	.	.	.	.
1217A	.	.	.	.		.	.	.	.	.
1217B	.	.	.	.		.	.	.	.	.
1218A	.	.	.	.	.	.	.	.	.	.
1218B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 85 CONFIGURATION 12P
AIR DENSITY RATIO 1.0014 OAT 17.8 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1222A	891.7	68.447	243.1	.005603	.0004704	0.179	INTERACTION
1222B	691.3	68.209	242.5	.005624	.0004708	0.179	INTERACTION
1223A	317.4	22.047	241.7	.002017	.0001532	0.069	INTERACTION
1223B	326.1	22.187	242.0	.002066	.0001538	0.069	INTERACTION
1224A	554.6	36.479	242.0	.003515	.0002529	0.112	INTERACTION
1224B	547.4	36.545	242.0	.003469	.0002533	0.112	INTERACTION
1225A	757.0	53.727	242.8	.004765	.0003698	0.151	INTERACTION
1225B	743.5	53.310	243.0	.004675	.0003667	0.151	INTERACTION
1226A	906.7	68.026	242.5	.005721	.0004695	0.176	INTERACTION
1226B	911.7	66.425	242.6	.005748	.0004718	0.176	INTERACTION
1227A	772.1	54.112	242.6	.004868	.0003731	0.152	INTERACTION
1227B	775.2	53.548	243.4	.004858	.0003670	0.152	INTERACTION
1228A	536.4	35.545	241.4	.003417	.0002477	0.111	INTERACTION
1228B	543.5	35.737	241.2	.003468	.0002494	0.111	INTERACTION
1229A	320.7	22.227	241.5	.002041	.0001547	0.068	INTERACTION
1229B	321.5	22.151	241.6	.002045	.0001541	0.067	INTERACTION
1230A	1014.4	76.525	243.8	.006335	.0005227	0.193	ISOLATED
1230B	1015.2	76.690	243.1	.006378	.0005284	0.193	ISOLATED
1231A	375.5	62.424	242.0	.005548	.0004327	0.170	ISOLATED
1231B	386.7	62.842	242.0	.005619	.0004356	0.170	ISOLATED
1232A	778.0	53.757	243.3	.004880	.0003688	0.152	ISOLATED
1232B	776.0	53.759	243.1	.004875	.0003694	0.152	ISOLATED
1233A	549.2	35.354	242.7	.003459	.0002436	0.112	ISOLATED
1233B	543.1	35.084	241.6	.003448	.0002436	0.112	ISOLATED
1234A	343.7	22.134	242.3	.002160	.0001530	0.067	ISOLATED
1234B	326.6	22.114	242.4	.002064	.0001528	0.068	ISOLATED

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 85 CONFIGURATION I&P ARM= 1.088 M
AIR DENSITY RATIO 1.0014 OAT 17.8 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1222A	62.9	2.758	1308.1	.015251	.0042323	0.375	0.0	0.000000	.015260	.015251
1222B	63.3	2.791	1308.1	.015348	.0042826	0.375	0.0	0.000000	.015207	.015348
1223A	21.0	0.521	1305.6	.005124	.0008023	0.173	0.0	0.000000	.004933	.005124
1223B	20.1	0.503	1306.8	.004888	.0007730	0.173	0.0	0.000000	.004956	.004888
1224A	34.2	0.880	1306.6	.008329	.0013537	0.237	0.0	0.000000	.008151	.008329
1224B	34.8	0.900	1306.8	.008456	.0013845	0.237	0.0	0.000000	.008163	.008456
1225A	49.0	1.639	1304.7	.011955	.0025288	0.318	0.0	0.000000	.012040	.011955
1225B	49.7	1.648	1305.8	.012109	.0025386	0.317	0.0	0.000000	.011927	.012109
1226A	58.0	2.599	1308.9	.014056	.0039828	0.372	0.0	0.000000	.015147	.014056
1226B	59.7	2.681	1307.6	.014494	.0041171	0.372	0.0	0.000000	.015265	.014494
1227A	51.6	1.706	1303.9	.012590	.0026350	0.316	0.0	0.000000	.012141	.012590
1227B	49.7	1.627	1305.5	.012102	.0025064	0.316	0.0	0.000000	.011984	.012102
1228A	35.8	0.912	1307.3	.008687	.0014008	0.235	0.0	0.000000	.007933	.008687
1228B	34.2	0.884	1301.5	.008373	.0013697	0.235	0.0	0.000000	.008048	.008373
1229A	20.1	0.542	1310.9	.004868	.0008287	0.173	0.0	0.000000	.004934	.004868
1229B	20.1	0.532	1310.6	.004860	.0008135	0.173	0.0	0.000000	.004919	.004860
1230A	.	.	.	.	.	.	.	.	.	.
1230B	.	.	.	.	.	.	.	.	.	.
1231A	.	.	.	.	.	.	.	.	.	.
1231B	.	.	.	.	.	.	.	.	.	.
1232A	.	.	.	.	.	.	.	.	.	.
1232B	.	.	.	.	.	.	.	.	.	.
1233A	.	.	.	.	.	.	.	.	.	.
1233B	.	.	.	.	.	.	.	.	.	.
1234A	.	.	.	.	.	.	.	.	.	.
1234B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 66 CONFIGURATION I2TF18
AIR DENSITY RATIO 0.9914 OAT 17.2 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1248A	662.6	66.500	244.6	.005522	.0004549	0.178	INTERACTION
1248B	690.5	66.692	244.0	.005579	.0004570	0.178	INTERACTION
1249A	330.4	23.360	241.9	.002117	.0001637	0.074	INTERACTION
1249B	333.5	23.166	242.2	.002131	.0001619	0.074	INTERACTION
1250A	555.2	37.506	242.8	.003530	.0002608	0.117	INTERACTION
1250B	555.4	37.355	242.3	.003546	.0002609	0.117	INTERACTION
1251A	766.6	55.765	243.5	.004646	.0003644	0.158	INTERACTION
1251B	770.6	55.461	244.6	.004649	.0003821	0.158	INTERACTION
1252A	691.9	67.057	243.2	.005655	.0004651	0.178	INTERACTION
1252B	695.2	67.078	243.9	.005642	.0004624	0.178	INTERACTION
1253A	786.1	56.280	243.4	.004976	.0003896	0.158	INTERACTION
1253B	779.2	56.152	243.7	.004920	.0003878	0.158	INTERACTION
1254A	552.6	37.418	243.4	.003500	.0002591	0.116	INTERACTION
1254B	554.0	37.330	243.9	.003497	.0002573	0.116	INTERACTION
1255A	334.0	23.104	245.0	.002066	.0001578	0.073	INTERACTION
1255B	339.9	23.199	243.4	.002151	.0001606	0.073	INTERACTION
1256A	1002.1	75.676	243.7	.006327	.0005226	0.195	ISOLATED
1256B	990.0	75.371	244.5	.006249	.0005169	0.195	ISOLATED
1257A	865.0	64.134	243.4	.005606	.0004440	0.175	ISOLATED
1257B	891.6	64.278	243.6	.005621	.0004435	0.175	ISOLATED
1258A	783.0	53.973	246.5	.004634	.0003642	0.153	ISOLATED
1258B	774.6	53.493	243.4	.004904	.0003703	0.154	ISOLATED
1259A	549.3	35.527	243.6	.003468	.0002451	0.113	ISOLATED
1259B	550.2	36.107	244.6	.003497	.0002474	0.113	ISOLATED
1260A	330.1	22.305	245.5	.002054	.0001518	0.069	ISOLATED
1260B	330.9	22.363	244.5	.002075	.0001534	0.068	ISOLATED

ORIGINAL PA
OF POOR QU

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NAS2-10771

RUN NO. 86 CONFIGURATION 12TF18 ARM= 1.088 M
AIR DENSITY RATIO 0.9914 DAT 17.2 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1248A	78.1	3.301	1305.8	.019211	.0051357	0.373	15.2	0.003742	.015028	.015470
1248B	76.4	3.237	1306.8	.018709	.0050123	0.373	15.9	0.003888	.015002	.014821
1249A	26.5	0.599	1304.2	.006525	.0009338	0.152	5.2	0.001294	.005292	.005231
1249B	26.7	0.599	1303.3	.006600	.0009352	0.152	4.9	0.001219	.005255	.005381
1250A	41.8	0.960	1305.0	.010285	.0014955	0.216	7.7	0.001895	.008466	.008390
1250B	43.5	0.966	1304.6	.010715	.0015366	0.216	7.3	0.001786	.008454	.008929
1251A	64.0	2.044	1305.4	.015751	.0031866	0.313	14.1	0.003461	.012606	.012270
1251B	65.1	2.119	1305.5	.016011	.0032961	0.313	12.8	0.003152	.012542	.012659
1252A	77.8	3.314	1307.8	.019085	.0051395	0.372	15.6	0.003871	.015106	.015213
1252B	75.3	3.177	1306.2	.018443	.0049236	0.372	15.4	0.003771	.015103	.014672
1253A	62.4	1.902	1308.1	.015285	.0029483	0.303	12.0	0.002933	.012674	.012352
1253B	63.1	1.955	1305.9	.015511	.0030410	0.302	12.4	0.003052	.012688	.012459
1254A	41.6	0.970	1302.2	.010296	.0015170	0.215	7.9	0.001947	.008502	.008349
1254B	42.3	0.980	1300.1	.010399	.0015241	0.215	8.0	0.001968	.008432	.008431
1255A	26.6	0.609	1302.7	.006562	.0009521	0.146	4.6	0.001143	.005246	.005419
1255B	26.8	0.607	1305.2	.006602	.0009451	0.146	4.6	0.001139	.005247	.005464
1256A	.	.	.	.	.	.	.	.	.	.
1256B	.	.	.	.	.	.	.	.	.	.
1257A	.	.	.	.	.	.	.	.	.	.
1257B	.	.	.	.	.	.	.	.	.	.
1258A	.	.	.	.	.	.	.	.	.	.
1258B	.	.	.	.	.	.	.	.	.	.
1259A	.	.	.	.	.	.	.	.	.	.
1259B	.	.	.	.	.	.	.	.	.	.
1260A	.	.	.	.	.	.	.	.	.	.
1260B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 87 CONFIGURATION T2TF18 ARM= 1.088 M
AIR DENSITY RATIO 0.9895 OAT 17.8 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET
1264A	78.7	3.238	1309.7	.019284	.0050154	0.367	15.0	0.003682	.015602
1264B	79.6	3.279	1310.5	.019469	.0050737	0.367	15.0	0.003678	.015791
1265A	18.3	0.450	1306.0	.004504	.0007011	0.100	2.8	0.000701	.003802
1265B	18.4	0.452	1306.1	.004525	.0007037	0.100	2.8	0.000690	.003835
1266A	35.8	0.815	1306.7	.008800	.0012686	0.186	5.4	0.001335	.007465
1266B	35.4	0.816	1306.6	.008714	.0012696	0.186	5.5	0.001357	.007357
1267A	45.7	1.072	1307.6	.011225	.0016659	0.221	6.6	0.001629	.009596
1267B	44.9	1.045	1307.2	.011035	.0016255	0.221	6.7	0.001641	.009395
1268A	53.7	1.306	1306.4	.013229	.0020335	0.246	8.2	0.002015	.011214
1268B	53.6	1.306	1306.3	.013196	.0020346	0.246	8.2	0.002026	.011172
1269A	64.1	1.973	1307.1	.015752	.0030690	0.298	10.9	0.002680	.013072
1269B	63.7	1.950	1307.2	.015651	.0030324	0.298	10.7	0.002625	.013026
1270A	72.5	2.612	1307.2	.017827	.0040626	0.332	13.2	0.003248	.014579
1270B	72.6	2.639	1306.6	.017866	.0041080	0.331	13.1	0.003229	.014637
1271A	63.1	1.824	1306.6	.015523	.0028397	0.285	10.5	0.002595	.012929
1271B	62.4	1.612	1308.1	.015336	.0028148	0.285	10.3	0.002534	.012802
1272A	53.4	1.311	1306.9	.013142	.0020402	0.247	7.7	0.001893	.011249
1272B	52.8	1.283	1306.7	.012982	.0019961	0.247	8.1	0.002003	.010979
1273A	45.7	1.048	1305.4	.011263	.0016342	0.222	6.8	0.001678	.009585
1273B	45.8	1.065	1306.0	.011287	.0016442	0.222	6.7	0.001655	.009632
1274A	36.5	0.825	1306.6	.008988	.0012842	0.188	5.5	0.001347	.007641
1274B	36.4	0.806	1306.8	.008952	.0012549	0.188	5.8	0.001434	.007518
1275A	17.4	0.446	1305.6	.004267	.0006946	0.097	3.1	0.000756	.003530
1275B	17.5	0.432	1306.2	.004316	.0006721	0.097	3.0	0.000745	.003571

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 68 CONFIGURATION I2TCF16
AIR DENSITY RATIO 0.9682 OAT 18.3 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1282A	674.6	65.562	245.4	.005465	.0004482	0.177	INTERACTION
1282B	669.9	65.479	244.9	.005454	.0004490	0.177	INTERACTION
1283A	335.4	23.304	244.4	.002112	.0001605	0.075	INTERACTION
1283B	340.6	23.162	244.7	.002139	.0001591	0.075	INTERACTION
1284A	556.4	38.159	245.0	.003465	.0002614	0.120	INTERACTION
1284B	553.5	37.750	243.4	.003517	.0002622	0.120	INTERACTION
1285A	784.0	57.435	245.0	.004911	.0003935	0.159	INTERACTION
1285B	790.4	57.540	244.2	.004965	.0003969	0.159	INTERACTION
1286A	671.3	65.008	244.5	.005481	.0004473	0.177	INTERACTION
1286B	666.0	65.237	244.9	.005433	.0004473	0.177	INTERACTION
1287A	770.3	56.315	245.6	.004663	.0003858	0.160	INTERACTION
1287B	792.4	57.534	243.2	.005040	.0004003	0.160	INTERACTION
1288A	557.7	38.238	244.6	.003523	.0002642	0.120	INTERACTION
1288B	553.3	38.050	243.5	.003511	.0002641	0.120	INTERACTION
1289A	329.4	22.895	244.6	.002061	.0001582	0.073	INTERACTION
1289B	330.3	23.174	245.0	.002069	.0001588	0.072	INTERACTION
1290A	987.1	75.482	245.0	.006183	.0005171	0.196	ISOLATED
1290B	990.0	75.843	245.7	.006173	.0005170	0.196	ISOLATED
1291A	661.8	63.914	245.3	.005514	.0004371	0.174	ISOLATED
1291B	676.1	63.716	245.0	.005468	.0004339	0.174	ISOLATED
1292A	769.6	55.330	245.8	.004918	.0003768	0.158	ISOLATED
1292B	762.5	54.912	246.2	.004856	.0003727	0.157	ISOLATED
1293A	561.3	36.000	243.9	.003549	.0002535	0.114	ISOLATED
1293B	565.1	36.011	245.4	.003531	.0002502	0.114	ISOLATED
1294A	347.7	23.008	244.5	.002180	.0001578	0.073	ISOLATED
1294B	347.6	22.953	244.8	.002181	.0001575	0.073	ISOLATED

ORIGINAL PAGE IS OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10/71

RUN NO. 68 CONFIGURATION 12TCF18 ARM= 1.066 M
AIR DENSITY RATIO 0.9882 OAT 18.3 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1262A	76.8	3.266	1308.6	.016863	.0051068	0.370	15.6	0.003825	.014804	.015038
1262B	75.9	3.247	1313.3	.016521	.0050090	0.369	16.5	0.004025	.014675	.014496
1263A	28.5	0.645	1305.2	.007041	.0010073	0.149	4.5	0.001120	.005288	.005521
1263B	27.5	0.646	1304.3	.006798	.0010103	0.149	4.7	0.001160	.005263	.005632
1264A	45.7	1.121	1302.8	.011334	.0017580	0.235	8.3	0.002062	.008690	.009272
1264B	47.1	1.144	1305.1	.011624	.0017869	0.235	8.3	0.002043	.008567	.009580
1265A	66.0	2.342	1305.5	.016293	.0036559	0.325	14.2	0.003513	.013026	.012780
1265B	65.5	2.321	1306.4	.016152	.0036193	0.325	14.0	0.003443	.013033	.012709
1266A	75.6	3.250	1309.5	.016541	.0050432	0.371	15.9	0.003907	.014654	.014634
1266B	76.0	3.253	1310.2	.016632	.0050434	0.371	16.9	0.004143	.014691	.014469
1267A	67.4	2.389	1306.0	.016607	.0037232	0.321	13.4	0.003310	.012751	.013297
1267B	69.2	2.490	1312.0	.016915	.0038493	0.321	12.9	0.003142	.012919	.013774
1268A	48.7	1.144	1306.8	.011968	.0017616	0.232	6.2	0.002027	.008655	.009961
1268B	47.3	1.145	1304.0	.011666	.0017693	0.232	6.6	0.002133	.008643	.009555
1269A	27.1	0.639	1306.3	.006751	.0010062	0.144	4.8	0.001184	.005234	.005567
1269B	26.1	0.623	1306.1	.006429	.0009725	0.144	5.0	0.001240	.005252	.005189
1290A	.	.	.	.	.	.	.	.	.	.
1290B	.	.	.	.	.	.	.	.	.	.
1291A	.	.	.	.	.	.	.	.	.	.
1291B	.	.	.	.	.	.	.	.	.	.
1292A	.	.	.	.	.	.	.	.	.	.
1292B	.	.	.	.	.	.	.	.	.	.
1293A	.	.	.	.	.	.	.	.	.	.
1293B	.	.	.	.	.	.	.	.	.	.
1294A	.	.	.	.	.	.	.	.	.	.
1294B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS
OF POOR QUALITY

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 89 CONFIGURATION T2TCF18 ARM= 1.088 M
AIR DENSITY RATIO 0.9789 OAT 21.1 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET
1298A	76.4	3.292	1310.0	.019407	.0051530	0.371	14.9	0.003688	.015719
1298B	79.8	3.370	1309.4	.019778	.0052802	0.371	14.6	0.003614	.016164
1299A	17.9	0.461	1305.6	.004466	.0007263	0.097	2.4	0.000598	.003868
1299B	17.8	0.453	1306.1	.004430	.0007135	0.097	2.5	0.000620	.003810
1300A	36.6	0.861	1305.5	.009122	.0013562	0.191	5.3	0.001330	.007792
1300B	36.5	0.869	1305.5	.009089	.0013688	0.191	5.3	0.001319	.007770
1301A	44.4	1.074	1307.0	.011048	.0016881	0.223	6.8	0.001692	.009356
1301B	44.9	1.086	1307.2	.011166	.0017075	0.223	6.4	0.001603	.009563
1302A	52.2	1.317	1305.6	.012999	.0020757	0.249	8.1	0.002017	.010982
1302B	52.6	1.323	1306.4	.013103	.0020856	0.248	7.5	0.001862	.011241
1303A	63.0	1.973	1306.8	.015664	.0031039	0.296	10.4	0.002589	.013076
1303B	61.8	1.929	1307.6	.015357	.0030309	0.296	11.0	0.002740	.012617
1304A	69.2	2.530	1308.3	.017175	.0039699	0.329	12.5	0.003113	.014062
1304B	70.9	2.605	1307.2	.017622	.0040954	0.329	12.1	0.003018	.014604
1305A	62.8	1.895	1306.0	.015640	.0029845	0.286	10.1	0.002525	.013115
1305B	62.0	1.863	1306.8	.015432	.0029311	0.286	10.9	0.002699	.012733
1306A	53.6	1.338	1306.2	.013343	.0021069	0.253	8.4	0.002082	.011261
1306B	53.6	1.343	1305.8	.013363	.0021157	0.253	8.4	0.002083	.011260
1307A	44.3	1.020	1305.2	.011034	.0016084	0.217	7.0	0.001741	.009293
1307B	44.0	1.025	1305.6	.010960	.0016146	0.217	6.9	0.001729	.009231
1308A	35.8	0.794	1305.8	.008908	.0012510	0.168	5.5	0.001374	.007535
1308B	35.5	0.775	1306.0	.008850	.0012207	0.168	5.6	0.001385	.007466
1309A	17.9	0.453	1305.6	.004466	.0007132	0.096	2.7	0.000676	.003790
1309B	17.4	0.428	1305.4	.004346	.0006744	0.096	3.0	0.000743	.003603

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 90 CONFIGURATION 12T
AIR DENSITY RATIO 0.9752 OAT 22.2 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1313A	976.3	77.746	244.5	.006224	.0005421	0.198	INTERACTION
1313B	979.9	77.746	245.1	.006215	.0005393	0.198	INTERACTION
1314A	336.0	22.717	243.9	.002153	.0001592	0.075	INTERACTION
1314B	339.4	23.136	244.6	.002162	.0001612	0.075	INTERACTION
1315A	570.5	38.469	244.2	.003646	.0002689	0.121	INTERACTION
1315B	558.7	38.275	244.5	.003562	.0002609	0.121	INTERACTION
1316A	758.3	56.845	244.0	.004906	.0003980	0.160	INTERACTION
1316B	774.7	57.016	244.7	.004930	.0003968	0.160	INTERACTION
1317A	934.1	79.274	245.5	.006225	.0005485	0.198	INTERACTION
1317B	979.2	76.449	245.6	.006189	.0005423	0.198	INTERACTION
1318A	770.7	57.132	246.4	.004838	.0003923	0.161	INTERACTION
1318B	773.7	57.136	247.3	.004820	.0003893	0.161	INTERACTION
1319A	535.1	37.622	246.0	.003433	.0002592	0.119	INTERACTION
1319B	537.0	37.568	244.7	.003545	.0002615	0.119	INTERACTION
1320A	345.6	23.344	244.6	.002203	.0001626	0.076	INTERACTION
1320B	339.9	23.177	244.6	.002165	.0001615	0.076	INTERACTION
1321A	332.4	22.239	246.0	.002083	.0001524	0.069	T/R @FLAT PITCH
1321B	329.6	22.066	244.6	.002100	.0001537	0.070	T/R @FLAT PITCH
1322A	1034.2	76.841	247.3	.006256	.0005236	0.198	ISOLATED
1322B	1035.0	76.829	246.1	.006329	.0005266	0.198	ISOLATED
1323A	750.0	54.766	243.7	.005012	.0003845	0.159	ISOLATED
1323B	757.9	55.376	245.6	.004974	.0003828	0.159	ISOLATED
1324A	552.0	35.793	245.3	.003498	.0002481	0.115	ISOLATED
1324B	557.9	36.032	245.4	.003532	.0002499	0.115	ISOLATED
1325A	329.2	22.269	246.5	.002065	.0001528	.9	ISOLATED
1325B	333.0	22.057	244.3	.002127	.0001540	0	ISOLATED

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 90 CONFIGURATION 12T ARM= 1.068 M
AIR DENSITY RATIO 0.9752 OAT 22.2 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1313A	74.7	3.217	1306.5	.018664	.0050816	0.369	0.0	0.000000	.017841	.018664
1313B	73.6	3.166	1304.9	.018431	.0050168	0.369	0.0	0.000000	.017885	.018431
1314A	20.7	0.469	1305.2	.005176	.0007737	0.125	0.0	0.000000	.005223	.005176
1314B	21.4	0.502	1305.5	.005340	.0007946	0.125	0.0	0.000000	.005317	.005340
1315A	37.3	0.644	1306.5	.009321	.0013332	0.201	0.0	0.000000	.008628	.009321
1315B	36.1	0.627	1303.9	.009057	.0013116	0.201	0.0	0.000000	.008819	.009057
1316A	53.4	1.434	1304.4	.013386	.0022728	0.275	0.0	0.000000	.013087	.013386
1316B	53.7	1.467	1303.2	.013488	.0023287	0.275	0.0	0.000000	.013150	.013488
1317A	73.4	3.140	1305.4	.018360	.0049675	0.370	0.0	0.000000	.018221	.018360
1317B	74.1	3.173	1313.5	.018312	.0049595	0.370	0.0	0.000000	.017811	.018312
1318A	53.4	1.436	1304.4	.013375	.0022758	0.271	0.0	0.000000	.013153	.013375
1318B	53.3	1.433	1301.5	.013424	.0023615	0.271	0.0	0.000000	.013213	.013424
1319A	35.1	0.797	1306.9	.008760	.0012585	0.191	0.0	0.000000	.008628	.008760
1319B	35.4	0.805	1303.6	.008872	.0012774	0.191	0.0	0.000000	.008660	.008872
1320A	22.2	0.516	1305.2	.005554	.0008174	0.134	0.0	0.000000	.005367	.005554
1320B	22.4	0.516	1304.6	.005615	.0008161	0.135	0.0	0.000000	.005334	.005615
1321A	0.0	0.255	1299.6	.000213	.0004069	0.005	0.0	0.000000	.005156	.000213
1321B	0.0	0.263	1304.1	.000212	.0004165	0.005	0.0	0.000000	.005083	.000212
1322A	.	.	.	.	.	.	.	.	.	.
1322B	.	.	.	.	.	.	.	.	.	.
1323A	.	.	.	.	.	.	.	.	.	.
1323B	.	.	.	.	.	.	.	.	.	.
1324A	.	.	.	.	.	.	.	.	.	.
1324B	.	.	.	.	.	.	.	.	.	.
1325A	.	.	.	.	.	.	.	.	.	.
1325B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS OF POOR QUALITY

ORIGINAL PAGE IS OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 91 CONFIGURATION 113TF18
AIR DENSITY RATIO 0.9601 OAT 26.7 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1329A	891.0	68.639	245.0	.005748	.0004840	0.165	INTERACTION
1329B	892.5	68.697	244.7	.005769	.0004857	0.165	INTERACTION
1330A	329.5	22.903	243.1	.002158	.0001642	0.074	INTERACTION
1330B	325.6	23.005	244.0	.002117	.0001636	0.074	INTERACTION
1331A	554.3	37.072	245.0	.003572	.0002614	0.119	INTERACTION
1331B	550.4	37.144	244.2	.003573	.0002637	0.119	INTERACTION
1332A	763.1	56.488	244.3	.005079	.0004007	0.162	INTERACTION
1332B	776.1	56.171	243.8	.005056	.0004002	0.162	INTERACTION
1333A	906.4	69.901	244.4	.005890	.0004954	0.168	INTERACTION
1333B	910.3	70.159	245.4	.005852	.0004935	0.168	INTERACTION
1334A	767.1	55.222	243.9	.004993	.0003931	0.161	INTERACTION
1334B	761.7	55.300	243.3	.004983	.0003957	0.161	INTERACTION
1335A	547.5	37.077	243.6	.003571	.0002646	0.119	INTERACTION
1335B	553.9	37.070	244.5	.003566	.0002625	0.119	INTERACTION
1336A	320.0	21.075	243.9	.002083	.0001543	0.067	INTERACTION
1336B	311.5	21.005	244.5	.002017	.0001530	0.067	INTERACTION
1337A	322.7	21.018	243.7	.002104	.0001556	0.067	T/R @FLAT PITCH
1337B	323.7	21.001	244.0	.002105	.0001555	0.067	T/R @FLAT PITCH
1338A	1012.2	78.171	244.6	.006537	.0005522	0.199	ISOLATED
1338B	1013.5	79.008	244.7	.006551	.0005566	0.199	ISOLATED
1339A	906.2	66.576	244.3	.005876	.0004723	0.183	ISOLATED
1339B	901.5	66.771	244.3	.005847	.0004737	0.183	ISOLATED
1340A	764.0	53.502	246.3	.004876	.0003720	0.157	ISOLATED
1340B	764.3	53.514	246.3	.004378	.0003735	0.157	ISOLATED
1341A	542.7	35.232	243.6	.003535	.0002510	0.114	ISOLATED
1341B	543.0	35.502	244.6	.003517	.0002512	0.114	ISOLATED
1342A	319.2	21.021	244.9	.002060	.0001546	0.067	ISOLATED
1342B	318.0	21.430	245.3	.002050	.0001509	0.067	ISOLATED

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 91 CONFIGURATION 113TF16 ARM= 1.088 M
AIR DENSITY RATIO 0.9601 OAT 26.7 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1329A	73.7	3.174	1308.8	0.016033	.0050752	0.372	15.0	0.003789	.015943	0.014843
1329B	74.7	3.185	1307.3	0.016922	.0051046	0.372	16.1	0.004008	.015992	0.014854
1330A	22.3	0.547	1306.7	0.005555	.0006776	0.147	3.9	0.000993	.005337	0.004603
1330B	21.9	0.544	1304.3	0.005562	.0006754	0.146	4.1	0.001042	.005380	0.004540
1331A	38.5	0.906	1305.5	0.009775	.0014361	0.210	7.1	0.001806	.008654	0.007967
1331B	38.8	0.910	1305.4	0.009856	.0014617	0.210	6.9	0.001792	.008672	0.008104
1332A	57.0	1.663	1306.4	0.014469	.0027010	0.284	10.7	0.002720	.013169	0.011749
1332B	56.3	1.624	1306.5	0.014422	.0026063	0.289	10.9	0.002753	.013093	0.011668
1333A	74.1	3.181	1306.4	0.016735	.0050889	0.371	14.9	0.003769	.016246	0.014965
1333B	75.3	3.255	1303.3	0.019322	.0052484	0.372	14.9	0.003799	.016433	0.015523
1334A	55.3	1.740	1306.4	0.014706	.0027922	0.291	11.4	0.002889	.012874	0.011017
1334B	57.3	1.706	1307.1	0.014644	.0027346	0.291	11.9	0.003021	.012878	0.011623
1335A	39.1	0.907	1311.0	0.009602	.0014452	0.198	7.8	0.001961	.008583	0.007901
1335B	39.6	0.906	1301.4	0.010134	.0014646	0.198	6.8	0.001752	.008709	0.008382
1336A	21.2	0.517	1306.1	0.005386	.0008299	0.124	3.9	0.000982	.005056	0.004404
1336B	20.9	0.518	1303.6	0.005328	.0008349	0.124	3.6	0.000907	.005059	0.004421
1337A	0.0	0.297	1304.2	0.000011	.0004738	-.012	-0.3	-.000063	.005103	0.000079
1337B	-0.7	0.295	1305.9	-.000169	.0004739	-.012	-0.2	-.000045	.005100	-.000124
1338A	.	.	.	.	.	.	.	.	.	.
1338B	.	.	.	.	.	.	.	.	.	.
1339A	.	.	.	.	.	.	.	.	.	.
1339B	.	.	.	.	.	.	.	.	.	.
1340A	.	.	.	.	.	.	.	.	.	.
1340B	.	.	.	.	.	.	.	.	.	.
1341A	.	.	.	.	.	.	.	.	.	.
1341B	.	.	.	.	.	.	.	.	.	.
1342A	.	.	.	.	.	.	.	.	.	.
1342B	.	.	.	.	.	.	.	.	.	.

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NAS2-10771

RUN NO. 92 CONFIGURATION 16TF18
AIR DENSITY RATIO 0.9608 OAT 25.6 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1351B	1016.0	78.164	245.3	.006535	.0005498	0.198	INTERACTION
1352A	332.4	21.549	244.9	.002144	.0001520	0.071	INTERACTION
1352B	332.0	21.045	244.9	.002146	.0001526	0.071	INTERACTION
1353A	564.1	35.974	244.9	.003637	.0002537	0.117	INTERACTION
1353B	556.0	35.026	244.4	.003600	.0002537	0.117	INTERACTION
1354A	770.4	54.233	243.9	.005049	.0003858	0.159	INTERACTION
1354B	776.1	53.940	244.7	.005026	.0003811	0.159	INTERACTION
1355B	977.3	74.964	244.4	.006332	.0005311	0.197	INTERACTION
1356A	771.3	53.327	243.9	.005017	.0003793	0.159	INTERACTION
1356B	779.9	53.560	245.7	.004999	.0003755	0.158	INTERACTION
1357A	515.3	36.000	244.9	.003646	.0002545	0.117	INTERACTION
1357B	555.6	35.021	244.7	.003590	.0002531	0.117	INTERACTION
1358A	323.5	21.120	244.3	.002096	.0001497	0.068	INTERACTION
1358B	325.2	21.314	244.4	.002106	.0001510	0.068	INTERACTION
1359A	331.4	21.192	244.4	.002146	.0001501	0.068	T/R @FLAT PITCH
1359B	325.3	21.004	244.0	.002114	.0001497	0.068	T/R @FLAT PITCH
1360A	987.3	74.520	245.1	.006358	.0005247	0.196	ISOLATED
1360B	983.3	74.596	245.1	.006334	.0005252	0.196	ISOLATED
1361A	735.7	53.003	245.0	.005040	.0003779	0.159	ISOLATED
1361B	776.0	54.148	245.3	.004995	.0003809	0.159	ISOLATED

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 92 CONFIGURATION 16TF18 ARM= 1.246 M
AIR DENSITY RATIO 0.9608 DAT 25.6 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1351B	73.1	3.153	1311.2	0.018405	.0050191	0.370	13.9	0.003504	.015784	0.014501
1352A	20.3	0.490	1306.1	0.005157	.0007989	0.112	3.3	0.000846	.004386	0.004310
1352B	20.3	0.501	1305.0	0.005165	.0008053	0.112	3.5	0.000893	.004412	0.004272
1353A	34.3	0.794	1305.0	0.008725	.0012754	0.186	5.2	0.001322	.007333	0.007403
1353B	33.3	0.800	1305.4	0.008459	.0012852	0.186	6.0	0.001536	.007299	0.006923
1354A	55.0	1.433	1306.5	0.013945	.0023015	0.264	9.7	0.002456	.011031	0.011490
1354B	54.3	1.413	1306.3	0.013761	.0022057	0.264	10.1	0.002549	.010975	0.011212
1355B	75.4	3.245	1306.1	0.019007	.0051903	0.370	14.2	0.003588	.015215	0.015479
1356A	54.3	1.403	1305.6	0.013766	.0022527	0.261	9.6	0.002439	.010860	0.011347
1356B	54.9	1.428	1304.5	0.013957	.0022964	0.261	9.3	0.002375	.010927	0.011582
1357A	35.9	0.612	1305.6	0.009110	.0013015	0.177	6.0	0.001533	.007337	0.007576
1357B	36.1	0.614	1306.1	0.009162	.0013060	0.177	6.6	0.001670	.007291	0.007492
1358A	20.5	0.503	1304.3	0.005227	.0008092	0.123	3.5	0.000883	.004310	0.004345
1358B	19.7	0.493	1304.0	0.005021	.0007922	0.123	3.3	0.000846	.004348	0.004173
1359A	0.2	0.295	1306.1	0.000050	.0004734	-.016	-0.3	-.000068	.004313	0.000124
1359B	0.0	0.295	1306.4	0.000000	.0004729	-.016	-0.2	-.000045	.004285	0.000045
1360A	.	.	.	.	.	.	.	.	.	.
1360B	.	.	.	.	.	.	.	.	.	.
1361A	.	.	.	.	.	.	.	.	.	.
1361B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 93 CONFIGURATION 116TF39
AIR DENSITY RATIO 0.9518 DAT 27.8 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1366A	784.3	57.993	244.2	.005139	.0004153	0.166	INTERACTION
1366B	797.7	57.833	244.7	.005201	.0004128	0.166	INTERACTION
1367A	331.4	22.361	245.5	.002148	.0001587	0.074	INTERACTION
1367B	340.4	22.197	243.5	.002243	.0001599	0.074	INTERACTION
1368A	565.4	37.245	246.4	.003636	.0002620	0.121	INTERACTION
1368B	564.4	37.289	243.8	.003708	.0002678	0.121	INTERACTION
1369A	795.3	57.506	245.5	.005155	.0004077	0.163	INTERACTION
1369B	790.3	57.407	245.1	.005139	.0004080	0.163	INTERACTION
1370A	829.2	62.045	244.6	.005411	.0004428	0.174	INTERACTION
1370B	826.1	62.069	244.6	.005391	.0004430	0.1[illegible]4	INTERACTION
1371A	751.1	57.453	245.5	.005127	.0004073	0.162	INTERACTION
1371B	788.1	57.692	245.6	.005095	.0004079	0.162	INTERACTION
1372A	550.8	36.444	244.7	.003591	.0002599	0.118	INTERACTION
1372B	549.5	36.200	243.6	.003611	.0002602	0.118	INTERACTION
1373A	334.6	22.180	244.7	.002183	.0001582	0.074	INTERACTION
1373B	339.5	22.295	244.3	.002220	.0001595	0.074	INTERACTION
1374A	335.2	22.238	244.1	.002197	.0001594	0.074	T/R @FLAT PITCH
1374B	339.9	22.381	244.2	.002226	.0001603	0.074	T/R @FLAT PITCH
1375A	957.6	75.619	245.3	.006413	.0005370	0.198	ISOLATED
1375B	996.4	76.422	245.0	.006480	.0005436	0.198	ISOLATED
1376A	834.3	59.616	244.0	.005472	.0004292	0.169	ISOLATED
1376B	837.6	60.233	244.6	.005462	.0004299	0.169	ISOLATED
1377A	756.7	55.157	245.9	.005082	.0003897	0.160	ISOLATED
1377B	775.3	54.352	244.9	.005046	.0003869	0.160	ISOLATED
1378A	560.0	36.603	245.4	.003633	.0002554	0.116	ISOLATED
1378B	554.9	36.021	245.3	.003603	.0002558	0.116	ISOLATED
1379A	341.3	22.303	244.5	.002221	.0001568	0.073	ISOLATED
1379B	345.4	22.274	244.2	.002262	.0001595	0.073	ISOLATED

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 93 CONFIGURATION 116TF39 ARM= 1.167 M
AIR DENSITY RATIO 0.9518 DAT 27.8 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1366A	77.3	3.272	1310.3	0.019601	.0052171	0.383	28.9	0.007289	.012523	0.012312
1366B	77.3	3.244	1312.0	0.019729	.0052056	0.383	29.1	0.007393	.012582	0.012336
1367A	28.3	0.603	1311.9	0.007100	.0009754	0.147	9.5	0.002416	.004866	0.004704
1367B	28.3	0.610	1309.5	0.007297	.0009624	0.147	9.3	0.002379	.004843	0.004917
1368A	45.9	1.010	1304.1	0.011602	.0016407	0.233	14.9	0.003839	.008195	0.007503
1368B	45.0	1.003	1304.6	0.011713	.0016282	0.232	15.2	0.003904	.008193	0.007303
1369A	75.3	2.327	1310.5	0.019160	.0045474	0.355	20.2	0.006075	.012530	0.012490
1369B	73.7	2.740	1312.9	0.018807	.0044037	0.355	26.7	0.006763	.012462	0.011904
1370A	79.3	3.332	1311.8	0.020131	.0053490	0.384	30.1	0.007632	.013491	0.012496
1370B	77.8	3.250	1310.0	0.019773	.0052373	0.364	31.0	0.007696	.013522	0.011670
1371A	75.7	2.934	1309.1	0.019308	.0047299	0.358	28.4	0.007233	.012544	0.012074
1371B	75.0	2.897	1309.4	0.019106	.0046673	0.184	28.6	0.007275	.012590	0.011331
1372A	48.9	1.053	1306.6	0.012500	.0017038	0.229	15.0	0.003983	.007988	0.008524
1372B	47.2	1.033	1307.4	0.012071	.0016703	0.229	15.7	0.004024	.007924	0.008047
1373A	26.6	0.505	1305.6	0.006561	.0009226	0.139	6.9	0.002291	.004868	0.004570
1373B	27.0	0.509	1303.7	0.006931	.0009252	0.139	6.6	0.002216	.004909	0.004733
1374A	-0.4	0.270	1304.8	-.000103	.0004507	0.003	-0.6	-.000148	.004887	0.000040
1374B	-0.2	0.203	1306.4	-.000040	.0004565	0.002	-0.4	-.000114	.004907	0.000066
1375A	.	.	.	.	.	.	.	.	.	.
1375B	.	.	.	.	.	.	.	.	.	.
1376A	.	.	.	.	.	.	.	.	.	.
1376B	.	.	.	.	.	.	.	.	.	.
1377A	.	.	.	.	.	.	.	.	.	.
1377B	.	.	.	.	.	.	.	.	.	.
1378A	.	.	.	.	.	.	.	.	.	.
1378B	.	.	.	.	.	.	.	.	.	.
1379A	.	.	.	.	.	.	.	.	.	.
1379B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 94 CONFIGURATION T16TF39 ARM= 1.167 M
AIR DENSITY RATIO 0.9518 OAT 27.8 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET
1383A	80.4	3.216	1309.8	0.020475	.0051793	0.377	28.9	0.007350	0.013125
1383B	78.6	3.140	1310.7	0.019985	.0050490	0.376	29.6	0.007533	0.012453
1384A	70.9	2.263	1308.2	0.018098	.0036531	0.320	25.6	0.006528	0.011569
1384B	70.9	2.272	1308.4	0.018092	.0036664	0.320	25.4	0.006481	0.011611
1385A	61.8	1.618	1306.3	0.015827	.0026199	0.284	21.6	0.005534	0.010293
1385B	62.8	1.650	1306.1	0.016083	.0026719	0.284	21.3	0.005456	0.010627
1386A	53.0	1.214	1305.8	0.013584	.0019675	0.252	17.8	0.004558	0.009025
1386B	52.5	1.205	1305.1	0.013471	.0019546	0.252	18.2	0.004665	0.008806
1387A	43.9	0.965	1304.3	0.011261	.0015672	0.221	15.2	0.003906	0.007355
1387B	43.9	0.967	1305.6	0.011249	.0015675	0.221	14.8	0.003784	0.007465
1388A	34.8	0.763	1305.5	0.008926	.0012373	0.171	12.1	0.003089	0.005836
1388B	35.1	0.755	1305.2	0.008987	.0012249	0.171	12.0	0.003079	0.005908
1389A	16.7	0.444	1304.4	0.004282	.0007210	0.098	5.8	0.001496	0.002786
1389B	16.9	0.452	1305.6	0.004342	.0007323	0.098	5.9	0.001504	0.002838
1390A	-0.4	0.316	1306.3	-.000114	.0005112	-.011	-0.2	-.000046	-.000068
1390B	-0.6	0.318	1306.6	-.000148	.0005146	-.011	-0.2	-.000057	-.000091
1391A	17.2	0.471	1305.6	0.004399	.0007635	0.126	6.3	0.001618	0.002781
1391B	17.4	0.465	1305.4	0.004469	.0007545	0.126	5.9	0.001505	0.002964
1392A	35.3	0.773	1304.8	0.009061	.0012542	0.187	12.4	0.003184	0.005877
1392B	34.9	0.776	1306.0	0.008943	.0012573	0.187	12.1	0.003099	0.005844
1393A	45.1	1.014	1304.6	0.011564	.0016459	0.224	15.5	0.003984	0.007580
1393B	44.8	1.000	1304.9	0.011502	.0016231	0.224	15.6	0.004005	0.007497
1394A	52.7	1.233	1305.9	0.013502	.0019977	0.253	17.5	0.004478	0.009024
1394B	53.2	1.242	1306.8	0.013607	.0020095	0.253	17.7	0.004540	0.009068
1395A	62.5	1.738	1306.1	0.016003	.0028140	0.293	21.4	0.005490	0.010513
1395B	62.5	1.742	1305.4	0.016030	.0028241	0.293	20.9	0.005347	0.010683
1396A	70.5	2.360	1307.4	0.018004	.0038143	0.330	26.0	0.006638	0.011366
1396B	71.0	2.378	1308.1	0.018123	.0038399	0.330	25.2	0.006439	0.011685
1397A	78.5	3.203	1311.2	0.019935	.0051477	0.377	29.1	0.007391	0.012544
1397B	79.5	3.255	1309.8	0.020249	.0052419	0.376	29.0	0.007384	0.012865
1398A	18.1	0.446	1305.0	0.004632	.0007242	0.117	6.0	0.001552	0.003080
1396B	18.3	0.436	1304.8	0.004690	.0007078	0.117	6.0	0.001552	0.003138

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 95 CONFIGURATION I19TF39
AIR DENSITY RATIO 0.9899 OAT 18.3 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1409A	801.4	56.919	244.2	.005046	.0003920	0.158	INTERACTION
1409B	802.4	57.300	243.9	.005065	.0003956	0.158	INTERACTION
1410A	903.5	66.894	243.7	.005713	.0004626	0.178	INTERACTION
1410B	895.6	66.667	244.0	.005649	.0004599	0.178	INTERACTION
1411A	348.5	23.260	246.4	.002155	.0001573	0.074	INTERACTION
1411B	355.9	23.975	243.7	.002250	.0001658	0.074	INTERACTION
1412A	574.6	37.803	243.3	.003646	.0002623	0.116	INTERACTION
1412B	573.2	37.799	243.9	.003618	.0002610	0.116	INTERACTION
1413A	821.1	58.602	244.8	.005143	.0004015	0.161	INTERACTION
1413B	807.1	57.936	246.1	.005004	.0003929	0.161	INTERACTION
1414A	903.5	66.794	244.4	.005679	.0004592	0.177	INTERACTION
1414B	882.3	65.965	243.4	.005594	.0004574	0.177	INTERACTION
1415A	562.8	37.682	243.6	.003562	.0002608	0.115	INTERACTION
1415B	572.1	37.696	243.9	.003611	.0002603	0.116	INTERACTION
1416A	348.4	23.599	243.1	.002215	.0001641	0.072	INTERACTION
1416B	345.3	23.360	243.6	.002186	.0001617	0.072	INTERACTION
1417A	353.8	23.238	244.0	.002231	.0001603	0.072	T/R ØFLAT PITCH
1417B	353.9	23.492	243.5	.002242	.0001627	0.072	T/R ØFLAT PITCH
1418A	1007.6	76.466	243.3	.006393	.0005307	0.196	ISOLATED
1418B	1018.8	77.049	243.2	.006470	.0005352	0.196	ISOLATED
1419A	913.4	66.693	243.8	.005771	.0004609	0.176	ISOLATED
1419B	905.8	65.778	243.8	.005723	.0004545	0.176	ISOLATED
1420A	808.6	56.205	243.7	.005113	.0003887	0.156	ISOLATED
1420B	798.2	55.629	244.0	.005034	.0003837	0.156	ISOLATED
1421A	581.0	38.184	244.3	.003655	.0002627	0.116	ISOLATED
1421B	579.7	38.134	244.3	.003647	.0002624	0.116	ISOLATED
1422A	356.1	23.846	245.0	.002227	.0001631	0.073	ISOLATED
1422B	352.7	23.834	245.0	.002206	.0001630	0.073	ISOLATED

ORIGINAL PAGE IS OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 95 CONFIGURATION 119TF39 ARM= 1.167 M
AIR DENSITY RATIO 0.9899 OAT 18.3 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1409A	78.3	2.780	1308.9	0.019203	.0043103	0.352	27.7	0.006783	.011953	0.012420
1409B	78.2	2.794	1309.8	0.019132	.0043253	0.352	26.3	0.006435	.012016	0.012696
1410A	79.2	3.047	1309.7	0.019396	.0047186	0.369	23.4	0.005728	.014030	0.013668
1410B	81.1	3.131	1307.1	0.019933	.0048676	0.369	29.2	0.007173	.014038	0.012760
1411A	30.8	0.607	1308.6	0.007550	.0009411	0.156	9.3	0.002269	.004887	0.005280
1411B	31.4	0.618	1305.8	0.007747	.0009629	0.156	8.9	0.002180	.005059	0.005566
1412A	50.6	1.086	1306.5	0.012455	.0016904	0.237	16.1	0.003951	.007968	0.008504
1412B	51.2	1.089	1306.8	0.012580	.0016932	0.237	15.0	0.003698	.007963	0.008883
1413A	75.2	2.581	1309.4	0.018425	.0039994	0.345	24.2	0.005927	.012297	0.012497
1413B	73.5	2.521	1305.5	0.018107	.0039282	0.345	23.0	0.005678	.012229	0.012429
1414A	76.9	2.963	1311.5	0.018779	.0045755	0.369	27.8	0.006777	.013971	0.012001
1414B	82.0	3.170	1301.9	0.020325	.0049677	0.369	25.1	0.006228	.014002	0.014098
1415A	52.5	1.116	1306.1	0.012934	.0017371	0.239	14.7	0.003614	.007948	0.009320
1415B	51.3	1.086	1306.8	0.012613	.0016896	0.239	16.0	0.003938	.007942	0.008675
1416A	33.3	0.669	1304.5	0.008212	.0010437	0.157	10.0	0.002459	.004989	0.005753
1416B	32.9	0.665	1304.5	0.008113	.0010385	0.157	10.2	0.002525	.004939	0.005588
1417A	-0.0	0.295	1305.0	-.000011	.0004608	0.003	-0.3	-.000077	.004909	0.000066
1417B	-0.8	0.298	1306.4	-.000208	.0004635	0.003	-0.6	-.000153	.004952	-.000055
1418A	.	.	.	.	.	.	.		.	.
1418B	.	.	.	.	.	.	.	.	.	.
1419A	.	.	.	.	.	.	.	.	.	.
1419B	.	.	.	.	.	.	.	.	.	.
1420A	.	.	.	.	.	.	.	.	.	.
1420B	.	.	.	.	.	.	.	.	.	.
1421A	.	.	.	.	.	.	.	.	.	.
1421B	.	.	.	.	.	.	.	.	.	.
1422A	.	.	.	.	.	.	.	.	.	.
1422B	.	.	.	.	.	.	.	.	.	.

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NAS2-10771

RUN NO. 96 CONFIGURATION 17TF39
AIR DENSITY RATIO 0.9934 OAT 17.8 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1428A	928.[illegible]	69.482	245.9	.005743	.0004703	0.182	INTERACTION
1428B	927.9	69.351	245.4	.005767	.0004714	0.182	INTERACTION
1429A	338.0	23.197	244.6	.002114	.0001566	0.070	INTERACTION
1429B	336.3	23.203	244.2	.002114	.0001592	0.070	INTERACTION
1430A	554.4	36.729	245.0	.003455	.0002503	0.113	INTERACTION
1430B	555.0	37.008	244.6	.003474	.0002531	0.113	INTERACTION
1431A	763.7	54.546	244.0	.004631	.0003749	0.156	INTERACTION
1431B	795.0	55.975	244.7	.004966	.0003825	0.156	INTERACTION
1432A	908.7	66.664	245.4	.005648	.0004532	0.180	INTERACTION
1432B	929.3	66.104	245.9	.005752	.0004614	0.179	INTERACTION
1433A	992.4	74.927	244.6	.006205	.0005124	0.194	ISOLATED
1433B	993.6	75.265	244.4	.006251	.0005156	0.194	ISOLATED
1434A	905.6	67.339	244.3	.005652	.0004597	0.181	ISOLATED
1434B	933.[illegible]	66.055	244.9	.005822	.0004642	0.181	ISOLATED
1435A	773.9	53.164	245.6	.004793	.0003603	0.153	ISOLATED
1435B	785.4	53.959	245.0	.004894	.0003677	0.153	ISOLATED
1436A	555.2	36.143	244.3	.003474	.0002474	0.112	ISOLATED
1436B	562.1	36.409	245.0	.003503	.0002481	0.112	ISOLATED
1437A	339.0	22.134	245.1	.002111	.0001507	0.070	ISOLATED
1437B	343.[illegible]	22.321	244.6	.002142	.0001524	0.070	ISOLATED

ORIGINAL PAGE IS OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN No. 90 CONFIGURATION 17TF39 ARM= 1.167 M
AIR DENSITY RATIO 0.9934 OAT 17.8 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1428A	80.2	3.160	1313.4	0.019457	.0046493	0.370	26.0	0.006302	.014440	0.013155
1428B	78.8	3.085	1314.6	0.019089	.0047250	0.370	25.9	0.006281	.014386	0.012809
1429A	26.5	0.605	1310.3	0.006463	.0009333	0.135	9.1	0.002223	.004844	0.004240
1429B	26.9	0.590	1307.0	0.006582	.0009240	0.135	8.9	0.002190	.004869	0.004392
1430A	42.7	0.924	1306.3	0.010473	.0014341	0.213	12.1	0.002967	.007717	0.007506
1430B	43.9	0.953	1305.1	0.010776	.0014806	0.213	14.1	0.003454	.007789	0.007322
1431A	60.3	1.400	1306.6	0.014782	.0022024	0.275	15.8	0.003881	.011451	0.010901
1431B	60.4	1.475	1305.4	0.014834	.0022917	0.275	20.5	0.005047	.011776	0.009788
1432A	79.1	3.109	1311.1	0.019260	.0047867	0.369	26.4	0.006422	.013903	0.012844
1432B	78.9	3.123	1311.9	0.019107	.0047981	0.369	28.5	0.006933	.014198	0.012254
1433A	.	.	.	.	.	.	.	.	.	.
1433B	.	.	.	.	.	.	.	.	.	.
1434A	.	.	.	.	.	.	.	.	.	.
1434B	.	.	.	.	.	.	.	.	.	.
1435A	.	.	.	.	.	.	.	.	.	.
1435B	.	.	.	.	.	.	.	.	.	.
1436A	.	.	.	.	.	.	.	.	.	.
1436B	.	.	.	.	.	.	.	.	.	.
1437A	.	.	.	.	.	.	.	.	.	.
1437B	.	.	.	.	.	.	.	.	.	.

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NAS2-10771

RUN NO. 97 CONFIGURATION 13TF39
AIR DENSITY RATIO 0.9934 OAT 17.8 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1441A	764.9	56.508	244.6	.004774	.0003858	0.158	INTERACTION
1441B	771.3	56.089	246.2	.004765	.0003787	0.158	INTERACTION
1442A	865.0	67.265	243.9	.005571	.0004626	0.178	INTERACTION
1442B	899.0	66.453	245.6	.005578	.0004510	0.177	INTERACTION
1443A	320.9	23.122	243.5	.002064	.0001596	0.071	INTERACTION
1443B	320.2	22.865	243.7	.002018	.0001576	0.071	INTERACTION
1444A	561.0	37.709	244.7	.003509	.0002577	0.117	INTERACTION
1444B	556.3	37.573	245.1	.003464	.0002558	0.117	INTERACTION
1445A	781.3	56.796	244.5	.004893	.0003887	0.159	INTERACTION
1445B	761.1	56.748	246.1	.004826	.0003835	0.159	INTERACTION
1446A	966.7	67.634	246.4	.005566	.0004572	0.178	INTERACTION
1446B	960.2	67.659	246.4	.005548	.0004574	0.178	INTERACTION
1447A	567.4	38.041	245.1	.003533	.0002594	0.116	INTERACTION
1447B	561.3	37.627	244.4	.003517	.0002576	0.116	INTERACTION
1448A	341.1	23.711	243.7	.002149	.0001634	0.073	INTERACTION
1448B	334.3	23.406	245.4	.002081	.0001591	0.073	INTERACTION
1449A	350.3	23.467	244.1	.002203	.0001612	0.073	T/R @FLAT PITCH
1449B	353.2	23.673	246.2	.002180	.0001598	0.073	T/R @FLAT PITCH
1450A	1011.4	77.600	244.9	.006308	.0005307	0.195	ISOLATED
1450B	1022.7	76.437	244.9	.006378	.0005350	0.196	ISOLATED
1451A	862.0	64.976	246.9	.005413	.0004361	0.175	ISOLATED
1451B	861.3	64.592	246.2	.005443	.0004301	0.175	ISOLATED
1452A	778.2	54.743	245.9	.004817	.0003705	0.155	ISOLATED
1452B	762.0	54.710	245.3	.004664	.0003723	0.155	ISOLATED
1453A	558.4	36.930	243.5	.003468	.0002506	0.114	ISOLATED
1453B	556.5	36.660	244.7	.003477	.0002505	0.114	ISOLATED
1454A	335.1	22.753	244.0	.002106	.0001564	0.071	ISOLATED
1454B	335.1	22.602	246.0	.002097	.0001542	0.071	ISOLATED

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 97 CONFIGURATION 13TF39 ARM= 1.068 M
AIR DENSITY RATIO 0.9934 OAT 17.8 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1441A	77.7	2.274	1305.0	0.019085	.0044671	0.353	26.0	0.006875	.012759	0.012210
1441B	77.1	2.037	1307.6	0.018307	.0043910	0.353	25.2	0.006162	.012613	0.012705
1442A	77.4	2.075	1310.8	0.018853	.0044291	0.353	29.6	0.007259	.015054	0.011593
1442B	76.4	2.015	1310.0	0.018624	.0043412	0.353	25.0	0.006085	.014889	0.012539
1443A	30.3	0.655	1305.6	0.007448	.0010177	0.157	10.1	0.002468	.005216	0.004980
1443B	31.5	0.664	1305.2	0.007747	.0010319	0.157	8.6	0.002120	.005161	0.005626
1444A	51.5	1.142	1303.7	0.012634	.0017770	0.236	15.5	0.003323	.008532	0.008661
1444B	52.0	1.154	1303.4	0.012309	.0017985	0.236	17.1	0.004218	.008504	0.008590
1445A	76.0	2.608	1309.0	0.018556	.0041222	0.340	23.0	0.005628	.012746	0.012929
1445B	75.1	2.628	1309.9	0.018323	.0040666	0.341	25.6	0.006292	.012717	0.012031
1446A	74.2	2.585	1309.0	0.018115	.0039868	0.341	22.6	0.005514	.015208	0.012601
1446B	75.6	2.672	1305.6	0.018504	.0041495	0.340	23.2	0.005669	.015307	0.012875
1447A	52.0	1.163	1306.3	0.012743	.0018033	0.236	17.3	0.004233	.008584	0.008510
1447B	51.2	1.153	1305.8	0.012576	.0017902	0.236	17.7	0.004340	.008480	0.008233
1448A	31.1	0.666	1306.3	0.007614	.0010304	0.151	9.7	0.002360	.005327	0.005253
1448B	31.9	0.666	1306.3	0.007822	.0010331	0.151	10.5	0.002586	.005275	0.005237
1449A	0.5	0.306	1306.4	0.000131	.0004739	0.010	-0.5	-.000120	.005287	0.000751
1449B	0.5	0.302	1298.6	0.000132	.0004736	0.010	-0.1	-.000033	.005396	0.000166
1450A	.	.	.	.	.	.	.	.	.	.
1450B	.	.	.	.	.	.	.	.	.	.
1451A	.	.	.	.	.	.	.	.	.	.
1451B	.	.	.	.	.	.	.	.	.	.
1452A	.	.	.	.	.	.	.	.	.	.
1452B	.	.	.	.	.	.	.	.	.	.
1453A	.	.	.	.	.	.	.	.	.	.
1453B	.	.	.	.	.	.	.	.	.	.
1454A	.	.	.	.	.	.	.	.	.	.
1454B	.	.	.	.	.	.	.	.	.	.

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 98 CONFIGURATION 13T
AIR DENSITY RATIO 0.9878 OAT 19.4 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1458A	1017.2	79.836	244.7	.006390	.0005486	0.198	INTERACTION
1458B	1019.3	79.475	246.5	.006311	.0005382	0.198	INTERACTION
1459A	358.4	23.718	244.7	.002252	.0001630	0.076	INTERACTION
1459B	353.8	23.433	244.2	.002233	.0001617	0.076	INTERACTION
1460A	558.0	36.750	245.1	.003493	.0002517	0.117	INTERACTION
1460B	542.8	36.809	245.8	.003381	.0002508	0.117	INTERACTION
1461A	792.2	56.449	244.3	.004994	.0003892	0.160	INTERACTION
1461B	789.0	55.809	244.1	.004983	.0003855	0.159	INTERACTION
1462A	999.6	78.320	245.3	.006253	.0005359	0.199	INTERACTION
1462B	994.2	79.083	248.2	.006074	.0005264	0.199	INTERACTION
1463A	797.3	57.811	246.1	.004954	.0003929	0.161	INTERACTION
1463B	801.4	57.788	246.4	.004967	.0003917	0.161	INTERACTION
1464A	571.8	37.762	244.7	.003592	.0002595	0.119	INTERACTION
1464B	570.4	38.432	244.5	.003590	.0002645	0.119	INTERACTION
1465A	334.4	23.583	244.6	.002103	.0001622	0.077	INTERACTION
1465B	339.7	23.947	245.3	[illegible]	.0001639	0.077	INTERACTION
1466A	345.3	23.511	246.1	[illegible]	.0001598	0.074	T/R @FLAT PITCH
1466B	346.6	23.504	245.4	[illegible]	.0001607	0.074	T/R @FLAT PITCH
1467A	998.1	76.924	245.6	[illegible]	.0005250	0.196	ISOLATED
1467B	990.3	76.281	244.7	[illegible]	.0005242	0.196	ISOLATED
1468A	799.2	56.384	245.3	[illegible]	.0003858	0.160	ISOLATED
1468B	799.4	56.653	244.5	[illegible]	.0003900	0.160	ISOLATED
1469A	571.5	37.669	244.0	.003612	.0002604	0.117	ISOLATED
1469B	577.7	37.643	244.3	.003642	.0002609	0.117	ISOLATED
1470A	340.0	23.151	245.1	.002129	.0001585	0.072	ISOLATED
1470B	350.2	23.303	245.0	.002195	.0001597	0.072	ISOLATED

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 98 CONFIGURATION 13T ARM= 1.091 M
AIR DENSITY RATIO 0.9878 OAT 19.4 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1458A	71.6	2.825	1310.3	0.017557	.0043804	0.355	0.0	0.000000	.017942	0.017557
1458B	70.5	2.783	1303.2	0.017471	.0043616	0.356	0.0	0.000000	.018053	0.017471
1459A	22.4	0.516	1305.9	0.005522	.0008052	0.131	0.0	0.000000	.005366	0.005522
1459B	21.9	0.518	1305.0	0.005419	.0008093	0.131	0.0	0.000000	.005308	0.005419
1460A	37.5	0.820	1305.9	0.009244	.0012794	0.203	0.0	0.000000	.008315	0.009244
1460B	38.1	0.838	1310.6	0.009341	.0012995	0.204	0.0	0.000000	.008268	0.009341
1461A	50.2	1.286	1305.9	0.012384	.0020071	0.267	0.0	0.000000	.012771	0.012384
1461B	52.2	1.331	1305.6	0.012882	.0020778	0.267	0.0	0.000000	.012631	0.012882
1462A	71.0	2.769	1307.8	0.017469	.0043096	0.354	0.0	0.000000	.017666	0.017469
1462B	73.6	2.894	1309.1	0.018069	.0044959	0.354	0.0	0.000000	.017804	0.018069
1463A	49.4	1.237	1308.7	0.012145	.0019219	0.261	0.0	0.000000	.013023	0.012145
1463B	51.6	1.281	1306.2	0.012729	.0019993	0.261	0.0	0.000000	.013068	0.012729
1464A	34.3	0.783	1305.9	0.008464	.0012218	0.186	0.0	0.000000	.008544	0.008464
1464B	35.5	0.794	1306.1	0.008769	.0012385	0.186	0.0	0.000000	.008692	0.008769
1465A	21.0	0.489	1306.1	0.005160	.0007635	0.123	0.0	0.000000	.005334	0.005160
1465B	20.7	0.478	1305.5	0.005107	.0007459	0.122	0.0	0.000000	.005421	0.005107
1466A	-0.2	0.281	1304.9	-.000055	.0004393	0.001	0.0	0.000000	.005327	-.000055
1466B	0.3	0.271	1305.4	0.000077	.0004226	0.001	0.0	0.000000	.005321	0.000077
1467A	.	.	.	.	.	.	.	.	.	.
1467B	.	.	.	.	.	.	.	.	.	.
1468A	.	.	.	.	.	.	.	.	.	.
1468B	.	.	.	.	.	.	.	.	.	.
1469A	.	.	.	.	.	.	.	.	.	.
1469B	.	.	.	.	.	.	.	.	.	.
1470A	.	.	.	.	.	.	.	.	.	.
1470B	.	.	.	.	.	.	.	.	.	.

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 99 CONFIGURATION 118TF39
A.R DENSITY RATIO 0.9609 OAT 19.4 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1476A	776.2	55.688	244.5	.004919	.0003874	0.159	INTERACTION
1476B	777.1	55.339	244.9	.004908	.0003857	0.159	INTERACTION
1477A	884.1	66.057	245.3	.005570	.0004554	0.180	INTERACTION
1477B	889.2	66.327	245.1	.005606	.0004574	0.180	INTERACTION
1478A	336.0	23.269	243.7	.002144	.0001624	0.073	INTERACTION
1478B	336.3	23.390	243.9	.002155	.0001630	0.073	INTERACTION
1479A	556.7	37.722	244.6	.003525	.0002613	0.118	INTERACTION
1479B	555.9	37.430	244.4	.003520	.0002597	0.118	INTERACTION
1480A	778.8	56.309	243.9	.004961	.0003923	0.161	INTERACTION
1480B	776.2	56.337	244.9	.004902	.0003892	0.161	INTERACTION
1481A	891.4	66.632	244.4	.005654	.0004623	0.181	INTERACTION
1481B	890.1	66.971	244.8	.005665	.0004630	0.181	INTERACTION
1482A	570.0	38.093	244.5	.003616	.0002641	0.118	INTERACTION
1482B	569.9	38.051	244.4	.003615	.0002640	0.118	INTERACTION
1483A	348.2	23.705	245.0	.002197	.0001642	0.074	INTERACTION
1483B	343.9	23.400	244.3	.002183	.0001625	0.074	INTERACTION
1484A	332.8	22.813	244.3	.002113	.0001584	0.071	T/R @FLAT PITCH
1484B	332.9	22.554	243.9	.002121	.0001571	0.071	T/R @FLAT PITCH
1485A	999.7	76.472	245.0	.006282	.0005256	0.196	ISOLATED
1485B	1014.3	77.379	245.3	.006377	.0005332	0.196	ISOLATED
1486A	898.5	65.900	243.3	.005753	.0004615	0.176	ISOLATED
1486B	896.3	65.427	245.0	.005656	.0004516	0.177	ISOLATED
1487A	785.4	55.007	244.7	.004969	.0003806	0.158	ISOLATED
1487B	787.3	55.133	244.7	.004961	.0003815	0.158	ISOLATED
1488A	555.3	36.180	245.4	.003499	.0002489	0.114	ISOLATED
1488B	562.8	36.000	245.3	.003546	.0002526	0.115	ISOLATED
1489A	336.0	22.526	245.8	.002121	.0001545	0.071	ISOLATED
1489B	339.4	22.734	245.7	.002131	.0001561	0.071	ISOLATED

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 99 CONFIGURATION E1BTF39 ARM= 1.068 M
AIR DENSITY RATIO 0.9809 OAT 19.4 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1476A	76.5	2.316	1310.4	0.018875	.0043965	0.364	28.3	0.006994	.012676	0.011880
1476B	76.1	2.308	1311.0	0.018780	.0043799	0.364	29.1	0.007174	.012652	0.011606
1477A	76.7	2.332	1308.1	0.019007	.0044369	0.366	28.5	0.007052	.015041	0.011955
1477B	77.5	2.373	1307.6	0.019207	.0045035	0.365	28.2	0.007001	.015106	0.012205
1478A	30.2	0.627	1306.5	0.007500	.0009842	0.179	10.0	0.002474	.005309	0.005026
1478B	30.4	0.633	1305.1	0.007371	.0009987	0.179	10.6	0.002634	.005349	0.004936
1479A	50.3	1.037	1308.0	0.012464	.0017026	0.249	14.5	0.003604	.008587	0.008860
1479B	50.0	1.031	1306.1	0.012412	.0016986	0.249	16.7	0.004156	.008546	0.008256
1480A	76.8	2.336	1309.9	0.018964	.0044333	0.364	28.1	0.006944	.012779	0.012020
1480B	75.3	2.701	1309.0	0.018820	.0043195	0.364	28.6	0.007064	.012804	0.011564
1481A	76.5	2.617	1309.0	0.018914	.0044079	0.364	28.2	0.006987	.015144	0.011927
1481B	76.1	2.733	1306.6	0.018849	.0043594	0.364	29.2	0.007222	.015231	0.011626
1482A	49.0	1.056	1305.5	0.012176	.0016611	0.240	17.1	0.004247	.008704	0.007931
1482B	48.3	1.049	1307.3	0.011969	.0016460	0.240	16.9	0.004192	.008670	0.007777
1483A	31.6	0.650	1309.4	0.007873	.0010155	0.163	10.9	0.002683	.005402	0.005190
1483B	31.4	0.640	1310.6	0.007749	.0009996	0.163	11.8	0.002667	.005306	0.005082
1484A	-0.3	0.267	1306.2	-.000077	.0004508	-.012	-0.5	-.000122	.005207	0.000044
1484B	-0.4	0.270	1306.0	-.000099	.0004332	-.012	-0.4	-.000099	.005150	0.000000
1485A	.	.	.	.	.	.	.	.	.	.
1485B	.	.	.	.	.	.	.	.	.	.
1486A	.	.	.	.	.	.	.	.	.	.
1486B	.	.	.	.	.	.	.	.	.	.
1487A	.	.	.	.	.	.	.	.	.	.
1487B	.	.	.	.	.	.	.	.	.	.
1488A	.	.	.	.	.	.	.	.	.	.
1488B	.	.	.	.	.	.	.	.	.	.
1489A	.	.	.	.	.	.	.	.	.	.
1489B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 100 CONFIGURATION 14TF39
AIR DENSITY RATIO 0.5747 DAT 21.1 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1495A	763.3	55.500	244.6	.004856	.0003862	0.159	INTERACTION
1495B	773.3	55.453	245.4	.004896	.0003842	0.158	INTERACTION
1496A	672.9	65.311	247.2	.005446	.0004456	0.179	INTERACTION
1496B	682.7	65.776	246.4	.005544	.0004519	0.179	INTERACTION
1497A	335.6	22.775	244.4	.002143	.0001590	0.073	INTERACTION
1497B	334.6	22.820	244.7	.002131	.0001590	0.072	INTERACTION
1498A	557.7	37.100	245.0	.003537	.0002582	0.116	INTERACTION
1498B	563.2	37.327	245.3	.003563	.0002588	0.116	INTERACTION
1499A	763.6	54.642	245.3	.004817	.0003773	0.158	INTERACTION
1499B	774.6	55.539	243.3	.004793	.0003757	0.158	INTERACTION
1500A	695.2	66.071	246.3	.005634	.0004598	0.160	INTERACTION
1500B	595.7	66.610	246.5	.005616	.0004566	0.160	INTERACTION
1501A	557.6	36.969	247.0	.003481	.0002527	0.115	INTERACTION
1501B	551.0	36.776	243.2	.003554	.0002594	0.115	INTERACTION
1502A	335.7	22.735	244.7	.002144	.0001583	0.072	INTERACTION
1502B	337.3	22.952	244.6	.002153	.0001600	0.072	INTERACTION
1503A	337.2	22.751	245.4	.002136	.0001576	0.071	T/R @FLAT PITCH
1503B	332.4	22.755	245.0	.002111	.0001561	0.071	T/R @FLAT PITCH
1505A	693.4	65.520	245.7	.005676	.0004528	0.179	ISOLATED
1505B	683.1	64.347	245.6	.005584	.0004435	0.179	ISOLATED
1506A	771.5	54.319	244.6	.004908	.0003779	0.158	ISOLATED
1506B	760.6	54.777	244.3	.004906	.0003611	0.158	ISOLATED
1507A	556.5	36.517	244.1	.003574	.0002556	0.115	ISOLATED
1507B	554.3	36.131	246.0	.003493	.0002490	0.115	ISOLATED
1508A	339.2	22.027	244.0	.002162	.0001577	0.071	ISOLATED
1508B	337.4	22.338	245.0	.002143	.0001536	0.071	ISOLATED

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 100 CONFIGURATION 14TF39 ARM= 1.088 M
AIR DENSITY RATIO 0.9747 OAT 21.1 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1495A	77.2	2.939	1314.3	0.019600	.0045890	0.366	30.1	0.007424	.012591	0.011642
1495B	77.5	2.947	1315.2	0.019119	.0045957	0.366	29.4	0.007261	.012566	0.011857
1496A	73.4	3.005	1307.1	0.019367	.0047447	0.366	28.2	0.007052	.014981	0.012515
1496B	76.4	3.003	1309.1	0.019507	.0047269	0.366	28.9	0.007185	.015042	0.012322
1497A	33.5	0.679	1306.0	0.008388	.0010732	0.164	11.1	0.002770	.005233	0.005610
1497B	33.5	0.679	1306.3	0.008328	.0010729	0.164	11.3	0.002835	.005243	0.005495
1498A	53.2	1.170	1305.1	0.013333	.0016536	0.251	17.7	0.004433	.008551	0.008900
1498B	53.0	1.162	1306.4	0.013407	.0016082	0.251	18.1	0.004536	.008572	0.008872
1499A	77.7	3.012	1309.9	0.019303	.0047349	0.369	29.1	0.007231	.012480	0.012074
1499B	78.8	3.000	1304.9	0.019744	.0048486	0.369	29.4	0.007354	.012782	0.012390
1500A	78.3	3.046	1313.2	0.019375	.0047658	0.369	29.2	0.007217	.015197	0.012158
1500B	76.7	3.070	1311.0	0.019528	.0048193	0.369	28.8	0.007153	.015234	0.012375
1501A	51.3	1.150	1304.7	0.012851	.0016038	0.243	16.1	0.004536	.008511	0.008315
1501B	51.0	1.128	1301.9	0.012974	.0017957	0.243	16.5	0.004164	.008504	0.008810
1502A	32.1	0.604	1304.4	0.008051	.0010847	0.162	11.5	0.002877	.005237	0.005174
1502B	32.1	0.633	1304.8	0.008040	.0010824	0.162	11.7	0.002920	.005283	0.005126
1503A	-0.0	0.287	1305.4	-.000011	.0004549	0.002	-0.4	-.000111	.005232	0.000100
1503B	-0.1	0.297	1304.1	-.000033	.0004704	0.002	-0.4	-.000112	.005244	0.000076
1505A	.	.	.	.	.	.	.	.	.	.
1505B	.	.	.	.	.	.	.	.	.	.
1506A	.	.	.	.	.	.	.	.	.	.
1506B	.	.	.	.	.	.	.	.	.	.
1507A	.	.	.	.	.	.	.	.	.	.
1507B	.	.	.	.	.	.	.	.	.	.
1508A	.	.	.	.	.	.	.	.	.	.
1508B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS
OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 101 CONFIGURATION 18TF39
AIR DENSITY RATIO 0.9710 OAT 22.2 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1512A	895.1	66.126	245.7	.005677	.0004587	0.178	INTERACTION
1512B	890.3	66.294	245.9	.005637	.0004591	0.178	INTERACTION
1513A	1000.0	77.316	246.3	.006310	.0005336	0.199	INTERACTION
1513B	1008.3	77.270	245.9	.006384	.0005351	0.199	INTERACTION
1514A	328.9	22.381	246.1	.002079	.0001547	0.071	INTERACTION
1514B	328.4	22.578	245.6	.002085	.0001568	0.071	INTERACTION
1515A	539.5	35.939	244.6	.003451	.0002514	0.115	INTERACTION
1515B	552.1	35.957	245.4	.003511	.0002501	0.115	INTERACTION
1516A	785.9	55.401	245.4	.004997	.0003853	0.158	INTERACTION
1516B	783.1	55.297	245.5	.004975	.0003842	0.158	INTERACTION
1517A	883.7	64.836	246.4	.005571	.0004471	0.177	INTERACTION
1517B	881.9	65.079	245.7	.005593	.0004514	0.177	INTERACTION
1518A	991.1	76.086	248.1	.006165	.0005176	0.197	INTERACTION
1518B	998.9	76.405	246.3	.006303	.0005273	0.197	INTERACTION
1519A	776.1	54.786	245.9	.004914	.0003794	0.158	INTERACTION
1519B	777.0	54.979	244.2	.004988	.0003860	0.158	INTERACTION
1520A	557.2	36.957	244.4	.003570	.0002590	0.116	INTERACTION
1520B	560.7	36.801	243.7	.003614	.0002595	0.116	INTERACTION
1521A	330.3	22.334	245.3	.002102	.0001555	0.071	INTERACTION
1521B	333.1	22.582	245.0	.002123	.0001575	0.071	INTERACTION
1522A	330.4	22.438	245.5	.002099	.0001559	0.071	T/R ØFLAT PITCH
1522B	327.9	22.582	245.7	.002079	.0001567	0.071	T/R ØFLAT PITCH
1523A	997.6	76.619	245.7	.006327	.0005315	0.197	ISOLATED
1523B	993.6	76.466	245.1	.006329	.0005327	0.197	ISOLATED
1524A	889.1	64.913	245.7	.005639	.0004503	0.176	ISOLATED
1524B	886.4	64.872	245.6	.005626	.0004504	0.176	ISOLATED
1525A	773.9	54.411	245.9	.004900	.0003768	0.158	ISOLATED
1525B	773.1	54.551	246.8	.004857	.0003749	0.158	ISOLATED
1526A	551.6	35.856	245.6	.003501	.0002489	0.115	ISOLATED
1526B	549.9	36.115	245.7	.003487	.0002505	0.115	ISOLATED
1527A	321.9	22.189	245.5	.002045	.0001542	0.068	ISOLATED
1527B	324.5	21.993	247.8	.002024	.0001500	0.068	ISOLATED

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 101 CONFIGURATION 18TF39 ARM= 1.246 M
AIR DENSITY RATIO 0.9710 DAT 22.2 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1512A	76.4	2.824	1307.7	0.019132	.0044710	0.361	29.1	0.007283	.013283	0.011849
1512B	76.6	2.845	1306.9	0.019201	.0045104	0.361	28.6	0.007181	.013334	0.012020
1513A	78.2	2.912	1309.9	0.019501	.0045961	0.361	27.6	0.006881	.015479	0.012620
1513B	76.6	2.834	1310.9	0.019096	.0044663	0.361	27.8	0.006927	.015447	0.012169
1514A	25.8	0.552	1299.5	0.006542	.0008860	0.135	9.2	0.002323	.004553	0.004218
1514B	26.6	0.549	1305.2	0.006685	.0008724	0.135	9.3	0.002336	.004553	0.004349
1515A	41.7	0.860	1304.1	0.010505	.0013701	0.206	14.6	0.003673	.007260	0.006831
1515B	42.0	0.869	1305.4	0.010561	.0013812	0.206	14.7	0.003688	.007248	0.006873
1516A	65.3	1.766	1305.3	0.016409	.0028075	0.305	21.8	0.005477	.011170	0.010932
1516B	65.3	1.767	1306.6	0.016366	.0028035	0.305	22.2	0.005567	.011127	0.010799
1517A	79.4	3.029	1306.8	0.019896	.0048034	0.368	27.7	0.006948	.013043	0.012948
1517B	78.1	2.968	1306.0	0.019598	.0047123	0.368	28.8	0.007225	.013108	0.012373
1518A	79.4	3.039	1302.6	0.020035	.0048496	0.369	29.0	0.007329	.015404	0.012706
1518B	77.9	2.974	1309.8	0.019437	.0046942	0.369	29.1	0.007260	.015299	0.012178
1519A	69.1	1.998	1305.4	0.017367	.0031744	0.310	22.2	0.005565	.011044	0.011802
1519B	68.1	1.961	1307.4	0.017069	.0031070	0.309	23.8	0.005950	.011049	0.011119
1520A	44.6	0.917	1309.3	0.011143	.0014481	0.213	14.8	0.003688	.007406	0.007455
1520B	45.1	0.919	1306.5	0.011325	.0014576	0.213	14.8	0.003704	.007407	0.007621
1521A	27.5	0.567	1303.7	0.006925	.0009033	0.142	9.7	0.002432	.004514	0.004494
1521B	28.5	0.567	1304.2	0.007166	.0009022	0.142	9.4	0.002374	.004561	0.004792
1522A	-0.2	0.271	1304.4	-.000056	.0004320	-.012	-0.2	-.000045	.004530	-.000011
1522B	-0.0	0.267	1302.8	-.000011	.0004255	-.012	-0.3	-.000079	.004571	0.000067
1523A	.	.	.	.	.	.	.	.	.	.
1523B	.	.	.	.	.	.	.	.	.	.
1524A	.	.	.	.	.	.	.	.	.	.
1524B	.	.	.	.	.	.	.	.	.	.
1525A	.	.	.	.	.	.	.	.	.	.
1525B	.	.	.	.	.	.	.	.	.	.
1526A	.	.	.	.	.	.	.	.	.	.
1526B	.	.	.	.	.	.	.	.	.	.
1527A	.	.	.	.	.	.	.	.	.	.
1527B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 102   CONFIGURATION 117TF39
AIR DENSITY RATIO 0.9881   OAT 17.8 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1533A	762.7	56.157	245.9	.004745	.0003822	0.159	INTERACTION
1533B	760.9	55.974	245.9	.004734	.0003809	0.159	INTERACTION
1534A	899.8	68.493	246.9	.005551	.0004622	0.179	INTERACTION
1534B	896.3	68.168	245.7	.005586	.0004647	0.179	INTERACTION
1535A	329.1	23.439	244.8	.002065	.0001609	0.072	INTERACTION
1535B	331.9	23.298	245.3	.002075	.0001594	0.072	INTERACTION
1536A	550.4	37.893	245.7	.003431	.0002583	0.117	INTERACTION
1536B	558.5	38.064	246.2	.003466	.0002584	0.117	INTERACTION
1537A	761.9	55.594	245.4	.004761	.0003799	0.157	INTERACTION
1537B	765.1	55.440	245.4	.004781	.0003789	0.157	INTERACTION
1538A	897.6	67.942	245.7	.005594	.0004631	0.179	INTERACTION
1538B	885.5	67.484	245.3	.005538	.0004616	0.179	INTERACTION
1539A	552.3	38.122	245.3	.003454	.0002608	0.117	INTERACTION
1539B	558.2	38.077	244.2	.003521	.0002627	0.117	INTERACTION
1540A	327.8	23.158	245.3	.002050	.0001584	0.071	INTERACTION
1540B	321.4	23.209	245.4	.002008	.0001586	0.071	INTERACTION
1541A	336.2	23.275	245.8	.002093	.0001585	0.071	T/R ØFLAT PITCH
1541B	339.5	23.596	247.1	.002091	.0001589	0.071	T/R ØFLAT PITCH
1542A	980.1	75.090	246.8	.006052	.0005071	0.196	ISOLATED
1542B	992.1	75.375	247.5	.006095	.0005064	0.195	ISOLATED
1543A	892.3	65.211	246.2	.005538	.0004426	0.177	ISOLATED
1543B	890.8	65.124	245.3	.005571	.0004455	0.177	ISOLATED
1544A	771.4	54.717	246.7	.004767	.0003698	0.154	ISOLATED
1544B	786.1	55.008	246.7	.004858	.0003718	0.154	ISOLATED
1545A	554.0	36.463	246.4	.003432	.0002471	0.112	ISOLATED
1545B	548.1	36.280	246.9	.003381	.0002448	0.113	ISOLATED
1546A	329.3	22.802	246.1	.002046	.0001549	0.068	ISOLATED
1546B	327.8	22.474	245.5	.002046	.0001535	0.068	ISOLATED

ORIGINAL PAGE IS OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 102 CONFIGURATION I17TF39 ARM= 1.088 M
AIR DENSITY RATIO 0.9881 OAT 17.8 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1533A	77.7	2.876	1310.9	0.019016	.0044539	0.363	29.2	0.007145	.012634	0.011871
1533B	78.1	2.888	1309.5	0.019165	.0044818	0.363	29.1	0.007149	.012619	0.012076
1534A	77.5	2.870	1311.1	0.018977	.0044430	0.364	27.1	0.006642	.015404	0.012336
1534B	77.5	2.885	1309.1	0.019035	.0044805	0.364	27.3	0.006695	.015377	0.012341
1535A	30.5	0.630	1306.6	0.007521	.0009825	0.173	10.3	0.002543	.005308	0.004977
1535B	31.3	0.634	1305.8	0.007728	.0009902	0.173	10.0	0.002459	.005283	0.005269
1536A	50.7	1.105	1307.8	0.012474	.0017198	0.245	15.3	0.003753	.008565	0.008721
1536B	49.9	1.096	1307.1	0.012280	.0017071	0.245	16.5	0.004075	.008613	0.008205
1537A	77.6	2.924	1309.2	0.019054	.0045395	0.365	28.4	0.006977	.012539	0.012077
1537B	77.8	2.940	1310.4	0.019053	.0045571	0.364	28.1	0.006878	.012482	0.012175
1538A	78.3	2.954	1309.1	0.019221	.0045864	0.365	28.1	0.006902	.015326	0.012319
1538B	77.8	2.931	1309.4	0.019102	.0045485	0.365	27.9	0.006855	.015216	0.012247
1539A	51.6	1.122	1306.4	0.012721	.0017492	0.242	15.6	0.003838	.008635	0.008883
1539B	50.9	1.106	1309.2	0.012502	.0017165	0.241	16.0	0.003931	.008588	0.008572
1540A	29.8	0.622	1307.6	0.007344	.0009675	0.173	9.9	0.002441	.005236	0.004904
1540B	30.3	0.627	1306.9	0.007473	.0009768	0.173	9.2	0.002268	.005253	0.005205
1541A	0.2	0.276	1306.3	0.000055	.0004308	-.004	-0.3	-.000077	.005273	0.000132
1541B	-0.3	0.265	1308.9	-.000066	.0004109	-.004	-0.4	-.000087	.005325	0.000022
1542A	.	.	.	.	.	.	.	.	.	.
1542B	.	.	.	.	.	.	.	.	.	.
1543A	.	.	.	.	.	.	.	.	.	.
1543B	.	.	.	.	.	.	.	.	.	.
1544A	.	.	.	.	.	.	.	.	.	.
1544B	.	.	.	.	.	.	.	.	.	.
1545A	.	.	.	.	.	.	.	.	.	.
1545B	.	.	.	.	.	.	.	.	.	.
1546A	.	.	.	.	.	.	.	.	.	.
1546B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 103 CONFIGURATION T17TF39 ARM= 1.088 M
AIR DENSITY RATIO 0.9807 OAT 20.0 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET
1549A	75.8	2.563	1308.9	0.018756	.0040109	0.343	27.5	0.006802	0.011953
1549B	75.7	2.565	1308.1	0.018747	.0040197	0.342	27.8	0.006888	0.011859
1550A	18.3	0.468	1305.2	0.004560	.0007369	0.129	5.7	0.001428	0.003132
1550B	18.5	0.469	1304.9	0.004618	.0007389	0.129	5.9	0.001473	0.003145
1551A	35.5	0.772	1305.4	0.008819	.0012148	0.189	11.6	0.002888	0.005931
1551B	35.8	0.779	1304.9	0.008904	.0012263	0.189	11.5	0.002868	0.006035
1552A	44.9	0.972	1305.1	0.011170	.0015301	0.221	14.6	0.003642	0.007528
1552B	44.4	0.968	1305.0	0.011061	.0015233	0.220	14.6	0.003643	0.007418
1554A	53.5	1.216	1305.0	0.013309	.0019148	0.249	17.5	0.004351	0.008957
1554B	54.1	1.210	1304.8	0.013468	.0019048	0.249	17.7	0.004419	0.009049
1555A	70.6	2.196	1306.7	0.017527	.0034485	0.326	24.2	0.005997	0.011530
1555B	70.5	2.197	1306.8	0.017502	.0034499	0.326	24.6	0.006095	0.011407
1556A	76.9	2.734	1307.7	0.019053	.0042866	0.351	27.7	0.006869	0.012184
1556B	76.4	2.702	1308.4	0.018925	.0042328	0.351	27.6	0.006841	0.012084
1557A	53.1	1.191	1305.3	0.013203	.0018742	0.249	17.2	0.004283	0.008920
1557B	53.8	1.205	1305.2	0.013382	.0018959	0.249	17.7	0.004416	0.008966
1558A	35.3	0.741	1305.8	0.008770	.0011650	0.188	11.7	0.002920	0.005851
1558B	35.4	0.745	1305.6	0.008794	.0011724	0.188	11.7	0.002909	0.005885
1559A	18.8	0.441	1305.1	0.004672	.0006936	0.126	6.2	0.001539	0.003133
1559B	18.7	0.454	1305.3	0.004648	.0007148	0.126	6.1	0.001516	0.003132
1560A	0.2	0.281	1305.4	0.000044	.0004419	-.008	-0.4	-.000089	0.000133
1560B	0.1	0.257	1305.8	0.000022	.0004045	-.008	-0.3	-.000077	0.000100

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 104 CONFIGURATION I17TF18
AIR DENSITY RATIO 0.9811 OAT 20.6 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1566A	881.4	68.325	246.1	.005514	.0004675	0.178	INTERACTION
1566B	887.2	68.082	246.2	.005545	.0004654	0.178	INTERACTION
1567A	1007.0	80.717	246.3	.006289	.0005513	0.198	INTERACTION
1567B	1005.6	81.002	246.4	.006274	.0005528	0.198	INTERACTION
1568A	338.8	23.765	247.3	.002098	.0001610	0.072	INTERACTION
1568B	340.4	23.782	245.7	.002137	.0001633	0.072	INTERACTION
1569A	561.8	39.178	245.7	.003527	.0002690	0.120	INTERACTION
1569B	562.3	38.988	244.6	.003560	.0002700	0.120	INTERACTION
1570A	773.1	57.581	246.6	.004816	.0003923	0.160	INTERACTION
1570B	756.5	56.691	248.1	.004657	.0003817	0.160	INTERACTION
1571A	883.0	68.212	247.1	.005477	.0004628	0.178	INTERACTION
1571B	884.3	67.910	246.7	.005504	.0004623	0.176	INTERACTION
1572A	1003.3	80.143	247.1	.006224	.0005437	0.197	INTERACTION
1572B	997.0	79.757	246.9	.006195	.0005420	0.197	INTERACTION
1573A	778.0	58.124	246.0	.004871	.0003980	0.159	INTERACTION
1573B	769.5	5[illegible].569	245.3	.004847	.0003966	0.159	INTERACTION
1574A	550.3	38.762	245.8	.003451	.0002659	0.117	INTERACTION
1574B	549.0	38.506	244.8	.003470	.0002662	0.117	INTERACTION
1575A	335.0	24.023	245.8	.002101	.0001648	0.072	INTERACTION
1575B	335.2	24.191	245.8	.002102	.0001659	0.072	INTERACTION
1576A	348.4	23.979	244.9	.002200	.0001656	0.072	T/R ØFLAT PITCH
1576B	349.6	23.911	246.8	.002174	.0001626	0.072	T/R ØFLAT PITCH
1577A	1006.0	77.183	249.2	.006136	.0005149	0.196	ISOLATED
1577B	1005.4	77.096	249.2	.006132	.0005143	0.196	ISOLATED
1578A	889.2	65.734	246.0	.005567	.0004501	0.178	ISOLATED
1578B	894.1	66.059	245.6	.005617	.0004539	0.178	ISOLATED
1579A	785.7	55.863	245.7	.004932	.0003835	0.157	ISOLATED
1579B	792.8	55.860	246.8	.004930	.0003799	0.157	ISOLATED
1580A	560.2	37.353	245.5	.003522	.0002569	0.114	ISOLATED
1580B	558.9	37.409	246.0	.003499	.0002562	0.114	ISOLATED
1581A	335.6	23.560	243.4	.002147	.0001648	0.069	ISOLATED
1581B	336.6	23.324	244.5	.002133	.0001616	0.069	ISOLATED

ORIGINAL PAGE IS OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 104 CONFIGURATION 117TF18 ARM= 1.088 M
AIR DENSITY RATIO 0.9811 OAT 20.6 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1566A	76.8	3.103	1309.5	0.018983	.0048490	0.376	13.7	0.003374	.015513	0.015608
1566B	76.0	3.069	1309.7	0.018779	.0047951	0.376	14.2	0.003505	.015453	0.015274
1567A	76.4	3.089	1308.2	0.018923	.0048377	0.376	13.8	0.003415	.018365	0.015509
1567B	75.9	3.059	1308.9	0.018770	.0047850	0.376	13.5	0.003345	.018409	0.015425
1568A	25.9	0.614	1310.8	0.006396	.0009581	0.167	3.3	0.000821	.005385	0.005575
1568B	25.9	0.622	1306.8	0.006435	.0009768	0.166	3.5	0.000861	.005422	0.005574
1569A	43.2	1.008	1305.0	0.010747	.0015867	0.228	6.6	0.001638	.008957	0.009109
1569B	43.4	1.009	1304.8	0.010806	.0015878	0.228	6.6	0.001639	.008916	0.009167
1570A	66.2	2.138	1304.6	0.016479	.0033670	0.328	10.9	0.002713	.013172	0.013766
1570B	66.2	2.129	1304.4	0.016485	.0033543	0.328	12.2	0.003047	.012973	0.013438
1571A	76.4	3.107	1306.1	0.018984	.0048816	0.377	14.0	0.003481	.015569	0.015503
1571B	76.5	3.108	1305.0	0.019025	.0048917	0.376	13.2	0.003287	.015525	0.015738
1572A	76.8	3.116	1306.7	0.019054	.0048909	0.377	13.8	0.003433	.018275	0.015621
1572B	76.9	3.118	1306.2	0.019091	.0048988	0.377	13.2	0.003281	.018202	0.015810
1573A	64.7	2.026	1305.9	0.016072	.0031850	0.325	11.1	0.002763	.013271	0.013308
1573B	64.6	2.020	1304.7	0.016089	.0031805	0.326	11.6	0.002879	.013168	0.013210
1574A	43.7	0.996	1304.5	0.010877	.0015685	0.225	6.7	0.001673	.008869	0.009205
1574B	44.0	1.002	1305.0	0.010946	.0015767	0.225	7.0	0.001738	.008803	0.009208
1575A	28.7	0.651	1305.5	0.007144	.0010240	0.177	4.3	0.001073	.005488	0.006071
1575B	28.3	0.654	1305.5	0.007033	.0010281	0.178	4.5	0.001117	.005526	0.005916
1576A	0.4	0.273	1308.7	0.000099	.0004278	0.005	-0.3	-.000066	.005451	0.000165
1576B	0.3	0.283	1299.9	0.000078	.0004485	0.006	-0.2	-.000056	.005510	0.000134
1577A	.	.	.	.	.	.	.	.	.	.
1577B	.	.	.	.	.	.	.	.	.	.
1578A	.	.	.	.	.	.	.	.	.	.
1578B	.	.	.	.	.	.	.	.	.	.
1579A	.	.	.	.	.	.	.	.	.	.
1579B	.	.	.	.	.	.	.	.	.	.
1580A	.	.	.	.	.	.	.	.	.	.
1580B	.	.	.	.	.	.	.	.	.	.
1581A	.	.	.	.	.	.	.	.	.	.
1581B	.	.	.	.	.	.	.	.	.	.

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 105 CONFIGURATION T17TF18 ARM= 1.088 M
AIR DENSITY RATIO 0.9724 OAT 22.8 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET
1585A	75.3	2.825	1305.9	0.018870	.0044790	0.354	13.1	0.003279	0.015591
1585B	75.2	2.824	1305.8	0.018862	.0044782	0.354	13.1	0.003291	0.015571
1586A	18.0	0.486	1303.6	0.004522	.0007741	0.128	2.6	0.000660	0.003861
1586B	17.7	0.481	1303.9	0.004441	.0007647	0.128	2.7	0.000671	0.003770
1587A	36.1	0.822	1304.3	0.009078	.0013066	0.199	5.3	0.001330	0.007747
1587B	36.1	0.819	1304.4	0.009065	.0013010	0.199	5.4	0.001364	0.007701
1588A	53.4	1.282	1303.4	0.013444	.0020410	0.256	7.8	0.001970	0.01147[illegible]
1588B	53.2	1.274	1304.3	0.013382	.0020258	0.256	7.7	0.001934	0.011448
1589A	76.4	2.998	1306.9	0.019118	.0047466	0.365	13.8	0.003463	0.015655
1589B	76.0	2.968	1306.6	0.019027	.0047006	0.365	13.7	0.003431	0.015596
1590A	53.8	1.297	1305.8	0.013485	.0020574	0.256	8.1	0.002030	0.011455
1590B	54.0	1.299	1304.9	0.013547	.0020622	0.256	8.0	0.001999	0.011548
1591A	36.1	0.792	1304.4	0.009065	.0012580	0.197	5.4	0.001364	0.007701
1591B	35.7	0.788	1304.2	0.008967	.0012530	0.197	5.6	0.001398	0.007570
1592A	17.9	0.428	1303.8	0.004509	.0006815	0.107	3.0	0.000761	0.003748
1592B	18.0	0.427	1303.6	0.004533	.0006802	0.107	3.0	0.000750	0.003783
1593A	0.2	0.270	1303.4	0.000056	.0004304	-.013	-0.0	-.000011	0.000067
1593B	0.2	0.269	1303.6	0.000045	.0004285	-.013	-0.0	-.000011	0.000056

ORIGINAL PAGE IS OF POOR QUALITY

ORIGINAL PAGE IS OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 106   CONFIGURATION 114TF18
AIR DENSITY RATIO 0.9631   OAT 25.6 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1597A	863.2	67.021	246.4	.005487	.0004659	0.179	INTERACTION
1597B	855.1	66.248	245.6	.005073	.0004637	0.179	INTERACTION
1598A	1003.9	80.452	245.7	.006019	.0005627	0.202	INTERACTION
1598B	1006.6	80.391	245.3	.006059	.0005642	0.202	INTERACTION
1599A	309.2	22.040	244.0	.002005	.0001563	0.070	INTERACTION
1599B	309.2	21.975	243.9	.002006	.0001559	0.070	INTERACTION
1600A	542.8	37.588	245.1	.003486	.0002640	0.119	INTERACTION
1600B	547.7	37.735	245.6	.003505	.0002641	0.119	INTERACTION
1601A	743.2	54.396	245.5	.004760	.0003811	0.159	INTERACTION
1601B	756.8	55.233	245.5	.004847	.0003869	0.159	INTERACTION
1602A	863.0	65.069	246.0	.005504	.0004539	0.178	INTERACTION
1602B	866.1	65.107	245.8	.005533	.0004550	0.177	INTERACTION
1603A	765.9	55.691	245.0	.004923	.0003915	0.158	INTERACTION
1603B	76[illegible].3	55.901	245.8	.004877	.0003906	0.158	INTERACTION
1604A	541.5	36.973	246.1	.003451	.0002577	0.115	INTERACTION
1604B	537.9	36.996	245.9	.003034	.0002583	0.115	INTERACTION
1605A	318.8	22.629	245.1	.002047	.0001589	0.073	INTERACTION
1605B	318.6	22.717	245.3	.002046	.0001594	0.072	INTERACTION
1606A	998.2	76.939	246.4	.006345	.0005349	0.195	ISOLATED
1606B	994.3	76.426	246.2	.006331	.0005322	0.195	ISOLATED
1607A	862.8	63.869	244.6	.005564	.0004505	0.179	ISOLATED
1607B	876.7	65.061	246.0	.005592	.0004539	0.178	ISOLATED
1608A	755.5	53.915	245.0	.004856	.0003790	0.158	ISOLATED
1608B	760.6	54.277	245.1	.004884	.0003812	0.158	ISOLATED
1609A	541.6	35.893	245.4	.003472	.0002517	0.114	ISOLATED
1609B	545.4	36.095	244.8	.003511	.0002542	0.114	ISOLATED
1610A	316.5	22.109	246.1	.002017	.0001541	0.068	ISOLATED
1610B	320.3	22.141	244.8	.002062	.0001559	0.068	ISOLATED

ORIGINAL PAGE OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 106 CONFIGURATION 114TF18 ARM= 1.088 M
AIR DENSITY RATIO 0.9631 OAT 25.6 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1597A	77.1	3.118	1308.4	0.019439	.0049727	0.383	14.4	0.003623	.015529	0.015816
1597B	76.1	3.088	1309.0	0.019163	.0049204	0.383	14.5	0.003642	.015335	0.015521
1598A	76.7	3.142	1308.8	0.019337	.0050082	0.383	13.5	0.003408	.018629	0.015929
1598B	75.3	3.080	1309.3	0.018974	.0049046	0.383	14.0	0.003528	.018600	0.015446
1599A	25.8	0.580	1305.3	0.006525	.0009298	0.165	4.5	0.001138	.005130	0.005387
1599B	26.2	0.588	1306.1	0.006619	.0009408	0.164	4.0	0.001024	.005109	0.005594
1600A	43.7	0.999	1305.9	0.011069	.0015992	0.231	7.1	0.001790	.008743	0.009278
1600B	43.1	0.992	1305.9	0.010900	.0015876	0.231	6.8	0.001734	.008777	0.009166
1601A	63.4	1.952	1304.3	0.016096	.0031327	0.317	11.0	0.002799	.012683	0.013296
1601B	62.9	1.936	1305.5	0.015930	.0031008	0.314	10.9	0.002760	.012853	0.013169
1602A	73.9	2.977	1308.8	0.018631	.0047456	0.377	14.5	0.003643	.015067	0.014987
1602B	74.3	2.986	1309.7	0.018693	.0047525	0.377	13.7	0.003459	.015054	0.015235
1603A	64.5	2.055	1305.5	0.016346	.0032914	0.321	11.5	0.002918	.012959	0.013429
1603B	61.6	1.915	1309.4	0.015499	.0030501	0.321	12.5	0.003147	.012931	0.012352
1604A	40.9	0.944	1304.4	0.010371	.0015152	0.225	7.8	0.001975	.008619	0.008396
1604B	41.3	0.954	1303.8	0.010494	.0015323	0.223	8.1	0.002056	.008633	0.008438
1605A	25.8	0.581	1305.4	0.006535	.0009311	0.167	4.1	0.001037	.005267	0.005498
1605B	25.2	0.582	1307.0	0.006373	.0009301	0.167	4.3	0.001090	.005274	0.005283
1606A	.	.	.	.	.	.	.	.	.	.
1606B	.	.	.	.	.	.	.	.	.	.
1607A	.	.	.	.	.	.	.	.	.	.
1607B	.	.	.	.	.	.	.	.	.	.
1608A	.	.	.	.	.	.	.	.	.	.
1608B	.	.	.	.	.	.	.	.	.	.
1609A	.	.	.	.	.	.	.	.	.	.
1609B	.	.	.	.	.	.	.	.	.	.
1610A	.	.	.	.	.	.	.	.	.	.
1610B	.	.	.	.	.	.	.	.	.	.

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 107 CONFIGURATION 115TF16
AIR DENSITY RATIO 0.9804 OAT 20.6 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1016A	685.2	66.297	244.4	.005618	.0004602	0.176	INTERACTION
1016B	691.2	66.860	244.5	.005651	.0004637	0.175	INTERACTION
1017A	1008.2	79.015	245.5	.006302	.0005436	0.196	INTERACTION
1017B	1007.1	79.095	245.0	.006359	.0005462	0.196	INTERACTION
1018A	331.7	23.223	244.6	.002101	.0001669	0.069	INTERACTION
1018B	331.0	23.209	244.3	.002103	.0001612	0.069	INTERACTION
1019A	503.2	37.360	243.0	.003631	.0002646	0.115	INTERACTION
1019B	505.3	37.943	243.5	.003616	.0002654	0.115	INTERACTION
1020A	788.0	56.143	245.9	.004945	.0003851	0.158	INTERACTION
1020B	793.0	56.363	246.7	.004939	.0003840	0.158	INTERACTION
1021A	911.7	65.020	244.3	.005766	.0004705	0.176	INTERACTION
1022A	731.3	55.500	243.4	.005001	.0003890	0.157	INTERACTION
1022B	770.0	55.375	242.8	.004994	.0003894	0.157	INTERACTION
1023A	557.9	37.313	246.0	.003456	.0002557	0.114	INTERACTION
1023B	557.4	37.314	246.2	.003486	.0002553	0.114	INTERACTION
1024A	344.1	23.603	244.7	.002178	.0001653	0.071	INTERACTION
1024B	346.9	23.910	242.5	.002236	.0001686	0.072	INTERACTION
1025A	350.1	23.617	244.1	.002228	.0001657	0.072	T/R @FLAT PITCH
1025B	351.0	23.002	246.3	.002199	.0001619	0.071	T/R @FLAT PITCH
1026A	1006.0	76.001	245.1	.006350	.0005285	0.195	ISOLATED
1026B	1005.9	76.000	245.3	.006293	.0005236	0.195	ISOLATED
1027A	684.4	64.566	243.7	.005646	.0004509	0.175	ISOLATED
1027B	686.0	64.534	245.0	.005598	.0004436	0.175	ISOLATED
1028A	785.2	55.017	247.2	.004870	.0003732	0.155	ISOLATED
1028B	769.7	55.508	245.3	.004977	.0003827	0.155	ISOLATED
1029A	549.5	36.227	244.5	.003467	.0002512	0.112	ISOLATED
1029B	546.3	36.355	245.3	.003457	.0002506	0.112	ISOLATED
1030A	338.1	23.020	244.5	.002143	.0001596	0.069	ISOLATED
1030B	337.0	23.115	244.3	.002141	.0001606	0.069	ISOLATED

ORIGINAL PAGE IS OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA L-10771

RUN NO. 107 CONFIGURATION 115TF18 ARM= 1.167 M
AIR DENSITY RATIO 0.9604 OAT 20.6 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CIFIN	CTNET REQD	CTNET ACTUAL
1016A	75.4	2.900	1307.6	0.016692	.0046500	0.380	15.4	0.003827	.014080	0.014865
1016B	76.1	3.026	1304.7	0.016900	.0047670	0.381	15.3	0.003801	.014268	0.015159
1017A	75.6	3.020	1304.9	0.016632	.0047563	0.380	14.6	0.003644	.016856	0.015167
1017B	73.0	2.908	1306.6	0.013330	.0046629	0.379	15.2	0.003768	.016830	0.014563
1018A	25.0	0.509	1306.9	0.006196	.0009250	0.166	3.7	0.000928	.004939	0.005268
1018B	25.2	0.593	1304.7	0.006283	.0009339	0.165	3.6	0.000942	.004953	0.005341
1019A	41.6	0.555	1305.6	0.010357	.0015032	0.220	6.9	0.001726	.008069	0.008631
1019B	41.4	0.904	1304.3	0.010323	.0015049	0.220	7.0	0.001741	.008102	0.008562
1020A	61.8	1.600	1303.7	0.015427	.0029465	0.310	11.3	0.002808	.012000	0.012619
1020B	60.9	1.600	1303.6	0.015203	.0028396	0.310	11.0	0.002741	.012045	0.012462
1021A	74.3	3.044	1306.7	0.016449	.0047816	0.379	15.5	0.003855	.014471	0.014593
1022A	59.5	1.044	1298.9	0.014947	.0026137	0.296	16.2	0.002560	.011963	0.012387
1022B	59.2	1.025	1304.7	0.014700	.0025608	0.296	10.9	0.002726	.011617	0.012034
1023A	41.0	0.930	1306.4	0.010179	.0014714	0.224	7.1	0.001757	.007942	0.008422
1023B	41.2	0.943	1298.9	0.010352	.0014994	0.224	7.1	0.001778	.008034	0.008575
1024A	26.4	0.615	1303.9	0.006579	.0009697	0.169	4.3	0.001065	.005103	0.005514
1024B	26.2	0.608	1305.5	0.006529	.0009568	0.168	4.5	0.001118	.005096	0.005412
1025A	0.0	0.295	1309.6	0.000000	.0004015	-.010	-0.4	-.000110	.005043	0.000110
1025B	-0.1	0.293	1301.5	-.000022	.0004043	-.010	-0.3	-.000078	.005079	0.000050
1026A	.	.	.	.	.	.	.	.	.	.
1026B	.	.	.	.	.	.	.	.	.	.
1027A	.	.	.	.	.	.	.	.	.	.
1027B	.	.	.	.	.	.	.	.	.	.
1028A	.	.	.	.	.	.	.	.	.	.
1028B	.	.	.	.	.	.	.	.	.	.
1029A	.	.	.	.	.	.	.	.	.	.
1029B	.	.	.	.	.	.	.	.	.	.
1030A	.	.	.	.	.	.	.	.	.	.
1030B	.	.	.	.	.	.	.	.	.	.

ORIGINAL PAGE IS OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 108 CONFIGURATION 120TF18
AIR DENSITY RATIO 0.9806 OAT 21.1 DEG C

MAIN ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1636A	891.5	67.452	244.5	.005652	.0004677	0.180	INTERACTION
1636B	899.7	66.466	246.0	.005636	.0004554	0.180	INTERACTION
1637A	994.8	78.231	246.8	.006189	.0005324	0.199	INTERACTION
1637B	998.1	78.569	245.3	.006290	.0005415	0.199	INTERACTION
1638A	336.8	23.585	246.1	.002108	.0001614	0.071	INTERACTION
1638B	335.2	23.856	244.6	.002123	.0001653	0.071	INTERACTION
1639A	558.8	37.655	243.9	.003561	.0002624	0.116	INTERACTION
1639B	560.2	37.614	244.7	.003546	.0002604	0.116	INTERACTION
1640A	781.8	55.671	245.5	.004918	.0003831	0.157	INTERACTION
1640B	781.4	55.941	245.9	.004899	.0003836	0.157	INTERACTION
1641A	892.2	66.327	244.0	.005680	.0004619	0.179	INTERACTION
1641B	900.1	66.790	246.2	.005629	.0004568	0.179	INTERACTION
1642A	773.5	55.843	244.4	.004908	.0003875	0.158	INTERACTION
1642B	781.0	55.758	245.9	.004896	.0003823	0.158	INTERACTION
1643A	557.7	37.845	246.0	.003494	.0002593	0.114	INTERACTION
1643B	553.6	37.739	246.9	.003441	.0002566	0.114	INTERACTION
1644A	328.7	23.620	245.5	.002068	.0001625	0.070	INTERACTION
1644B	327.6	23.459	245.0	.002068	.0001620	0.070	INTERACTION
1645A	335.2	23.786	246.2	.002096	.0001627	0.072	T/R @FLAT PITCH
1645B	335.1	23.969	247.9	.002067	.0001617	0.072	T/R @FLAT PITCH
1646A	1008.4	77.348	244.4	.006398	.0005368	0.195	ISOLATED
1646B	1002.7	76.991	247.2	.006217	.0005221	0.195	ISOLATED
1647A	886.8	66.030	246.1	.005550	.0004520	0.177	ISOLATED
1647B	884.5	65.475	245.8	.005550	.0004494	0.177	ISOLATED
1648A	769.2	54.800	246.3	.004806	.0003745	0.157	ISOLATED
1648B	765.1	54.821	245.4	.004818	.0003775	0.157	ISOLATED
1649A	561.6	37.721	245.8	.003524	.0002589	0.116	ISOLATED
1649B	561.9	37.994	244.4	.003565	.0002637	0.116	ISOLATED
1650A	334.1	23.830	245.3	.002105	.0001642	0.073	ISOLATED
1650B	334.9	23.223	246.8	.002084	.0001580	0.071	ISOLATED

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 108 CONFIGURATION I20TF18 ARM= 1.246 M
AIR DENSITY RATIO 0.9806 OAT 21.1 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1636A	69.5	2.407	1307.1	0.017252	.0037774	0.346	13.7	0.003389	.013430	0.013864
1636B	68.9	2.384	1303.9	0.017194	.0037602	0.346	13.5	0.003361	.013299	0.013833
1637A	74.8	2.947	1309.3	0.018503	.0046095	0.375	15.4	0.003817	.015523	0.014686
1637B	75.5	2.987	1305.5	0.018788	.0046999	0.374	14.7	0.003651	.015681	0.015136
1638A	24.1	0.531	1304.8	0.005993	.0008364	0.158	3.8	0.000942	.004712	0.[illegible]5051
1638B	24.3	0.537	1307.3	0.006036	.0008418	0.158	3.8	0.000938	.004748	0.[illegible]5098
1639A	37.8	0.856	1310.6	0.009333	.0013356	0.212	6.5	0.001614	.007458	0.007719
1639B	37.9	0.861	1305.5	0.009438	.0013544	0.212	6.3	0.001560	.007507	0.007878
1640A	54.2	1.385	1305.9	0.013481	.0021776	0.279	9.3	0.002322	.011105	0.011159
1640B	54.8	1.407	1305.6	0.013618	.0022135	0.278	9.4	0.002334	.011163	0.011284
1641A	68.1	2.405	1307.3	0.016883	.0037733	0.341	13.4	0.003321	.013201	0.013561
1641B	67.4	2.377	1310.8	0.016629	.0037091	0.342	13.3	0.003282	.013224	0.013347
1642A	56.7	1.480	1306.2	0.014094	.0023255	0.280	9.9	0.002465	.011134	0.011629
1642B	56.7	1.475	1310.4	0.013993	.0023034	0.280	9.8	0.002427	.011046	0.011565
1643A	37.1	0.809	1309.3	0.009164	.0012657	0.202	6.4	0.001584	.007510	0.007580
1643B	36.6	0.796	1304.1	0.009115	.0012559	0.202	6.5	0.001619	.007549	0.007496
1644A	23.8	0.541	1302.5	0.005936	.0008547	0.157	3.9	0.000967	.004736	0.004969
1644B	23.8	0.535	1306.0	0.005916	.0008411	0.157	4.0	0.000984	.004679	0.004932
1645A	0.4	0.254	1304.7	0.000089	.0004006	0.030	-0.2	-.000055	.004753	0.000144
1645B	0.2	0.255	1304.4	0.000055	.0004022	0.031	-0.2	-.000055	.004792	0.000111
1646A	.	.	.	.	.	.	.	.	.	.
1646B	.	.	.	.	.	.	.	.	.	.
1647A	.	.	.	.	.	.	.	.	.	.
1647B	.	.	.	.	.	.	.	.	.	.
1648A	.	.	.	.	.	.	.	.	.	.
1648B	.	.	.	.	.	.	.	.	.	.
1649A	.	.	.	.	.	.	.	.	.	.
1649B	.	.	.	.	.	.	.	.	.	.
1650A	.	.	.	.	.	.	.	.	.	.
1650B	.	.	.	.	.	.	.	.	.	.

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA2-10771

RUN NO. 109 CONFIGURATION I1TF18
AIR DENSITY RATIO 0.9735 OAT 23.3 DEG C

MAIN ROTOR DATA

ORIGINAL PAGE IS OF POOR QUALITY

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	MODE
1654A	876.5	66.244	244.9	.005578	.0004611	0.178	INTERACTION
1654B	878.9	66.282	245.5	.005570	.0004594	0.178	INTERACTION
1655A	1001.6	78.105	245.0	.006369	.0005432	0.197	INTERACTION
1655B	988.3	77.752	244.8	.006295	.0005417	0.197	INTERACTION
1656A	327.2	23.100	243.9	.002100	.0001622	0.072	INTERACTION
1656B	326.0	23.586	244.4	.002084	.0001649	0.072	INTERACTION
1657A	555.4	37.290	245.3	.003526	.0002589	0.116	INTERACTION
1657B	556.2	37.680	245.9	.003513	.0002603	0.116	INTERACTION
1658A	775.8	56.953	245.7	.004908	.0003941	0.160	INTERACTION
1658B	790.3	57.310	245.7	.005000	.0003965	0.160	INTERACTION
1659A	878.6	65.928	245.0	.005587	.0004585	0.180	INTERACTION
1659B	879.5	66.092	245.1	.005587	.0004592	0.179	INTERACTION
1660A	1002.6	78.937	245.6	.006348	.0005466	0.198	INTERACTION
1660B	1003.4	78.334	245.3	.006369	.0005438	0.198	INTERACTION
1661A	773.6	56.340	245.5	.004902	.0003905	0.159	INTERACTION
1661B	774.7	55.794	244.7	.004938	.0003890	0.160	INTERACTION
1662A	555.2	37.956	244.8	.003536	.0002644	0.117	INTERACTION
1662B	554.3	37.941	244.4	.003543	.0002652	0.117	INTERACTION
1663A	329.6	23.789	244.5	.002105	.0001662	0.071	INTERACTION
1663B	332.5	23.482	245.6	.002105	.0001626	0.072	INTERACTION
1664A	324.0	23.292	244.5	.002069	.0001627	0.070	T/R ƟFLAT PITCH
1664B	325.2	23.568	244.6	.002075	.0001645	0.070	T/R ƟFLAT PITCH
1665A	1005.5	77.450	243.1	.006498	.0005475	0.198	ISOLATED
1665B	1003.9	77.839	246.0	.006335	.0005372	0.197	ISOLATED
1666A	876.1	64.881	245.8	.005537	.0004485	0.177	ISOLATED
1666B	878.7	64.818	245.6	.005564	.0004489	0.177	ISOLATED
1667A	784.2	55.726	245.5	.004970	.0003862	0.158	ISOLATED
1667B	781.1	56.029	244.6	.004984	.0003910	0.158	ISOLATED
1668A	554.0	37.196	244.4	.003541	.0002600	0.115	ISOLATED
1668B	552.3	37.591	244.7	.003521	.0002621	0.115	ISOLATED
1669A	330.0	23.400	244.9	.002100	.0001629	0.070	ISOLATED
1669B	328.2	23.202	244.7	.002092	.0001618	0.070	ISOLATED

OF POOR QUALITY

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 109 CONFIGURATION 11TF18 ARM= 1.088 M
AIR DENSITY RATIO 0.9735 OAT 23.3 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET REQD	CTNET ACTUAL
1654A	75.9	3.112	1307.4	0.018970	.0049178	0.382	15.2	0.003790	.015206	0.015180
1654B	75.2	3.088	1307.8	0.018780	.0048766	0.383	16.2	0.004054	.015205	0.014727
1655A	75.7	3.139	1308.7	0.018889	.0049499	0.383	15.3	0.003804	.017895	0.015085
1655B	74.9	3.104	1308.5	0.018685	.0048974	0.382	16.3	0.004072	.017820	0.014613
1656A	26.0	0.612	1306.9	0.006495	.0009679	0.171	4.8	0.001201	.005307	0.005294
1656B	26.0	0.618	1306.9	0.006495	.0009779	0.171	4.8	0.001201	.005419	0.005294
1657A	45.4	1.083	1306.5	0.011352	.0017135	0.244	7.5	0.001881	.008572	0.009471
1657B	45.6	1.086	1306.7	0.011404	.0017176	0.242	7.8	0.001947	.008659	0.009457
1658A	68.4	2.425	1302.6	0.017207	.0038607	0.339	13.2	0.003314	.013171	0.013894
1658B	67.3	2.380	1307.0	0.016814	.0037626	0.339	12.6	0.003147	.013164	0.013667
1659A	76.5	3.195	1309.0	0.019069	.0050363	0.381	14.7	0.003659	.015098	0.015410
1659B	74.9	3.105	1309.6	0.018652	.0048903	0.381	15.9	0.003965	.015121	0.014687
1660A	74.6	3.099	1309.7	0.018582	.0048795	0.382	16.0	0.003976	.018056	0.014607
1660B	75.6	3.147	1308.5	0.01885[illegible]	.0049650	0.382	15.4	0.003850	.017953	0.015001
1661A	64.5	2.114	1305.3	0.01616[illegible]	.0033511	0.324	11.7	0.002921	.012974	0.013245
1661B	64.4	2.099	1305.6	0.0161[illegible]	.0033257	0.323	11.5	0.002886	.012843	0.013250
1662A	44.5	0.991	1302.0	0.011206	.0015797	0.230	7.4	0.001871	.008786	0.009335
1662B	43.6	0.976	1304.5	0.010951	.0015497	0.230	7.3	0.001831	.008749	0.009120
1663A	28.5	0.607	1303.7	0.007154	.0009640	0.171	4.1	0.001028	.005492	0.006125
1663B	27.7	0.598	1303.7	0.006952	.0009509	0.171	4.2	0.001062	.005422	0.005891
1664A	0.3	0.260	1305.2	0.000067	.0004122	0.005	-0.2	-.000045	.005365	0.000112
1664B	0.4	0.257	1306.7	0.000089	.0004071	0.005	-0.1	-.000033	.005416	0.000122
1665A	.	.	.	.	.	.	.	.	.	.
1665B	.	.	.	.	.	.	.	.	.	.
1666A	.	.	.	.	.	.	.	.	.	.
1666B	.	.	.	.	.	.	.	.	.	.
1667A	.	.	.	.	.	.	.	.	.	.
1667B	.	.	.	.	.	.	.	.	.	.
1668A	.	.	.	.	.	.	.	.	.	.
1668B	.	.	.	.	.	.	.	.	.	.
1669A	.	.	.	.	.	.	.	.	.	.
1669B	.	.	.	.	.	.	.	.		.

MAIN ROTOR-TAIL ROTOR INTERACTION TEST
NASA 2-10771

RUN NO. 110 CONFIGURATION T1T ARM= 1.088 M
AIR DENSITY RATIO 0.9681 OAT 25.0 DEG C

TAIL ROTOR DATA

RECORD	THRUST (N)	TORQUE (N-M)	ANGULAR VELOCITY (RAD/S)	CT	CP	THETA (RAD)	FIN FORCE (N)	CTFIN	CTNET
1673A	73.4	3.031	1308.6	0.018406	.0048072	0.378	0.0	0.000000	0.018406
1673B	73.6	3.049	1306.7	0.018516	.0048509	0.378	0.0	0.000000	0.018516
1674A	17.2	0.461	1307.1	0.004327	.0007327	0.129	0.0	0.000000	0.004327
1674B	18.1	0.467	1307.2	0.004550	.0007430	0.129	0.0	0.000000	0.004550
1675A	36.7	0.862	1306.4	0.009245	.0013711	0.211	0.0	0.000000	0.009245
1675B	36.5	0.860	1306.5	0.009177	.0013688	0.211	0.0	0.000000	0.009177
1676A	45.1	1.079	1305.1	0.011383	.0017207	0.242	0.0	0.000000	0.011383
1676B	45.2	1.088	1305.1	0.011394	.0017347	0.242	0.0	0.000000	0.011394
1677A	54.8	1.492	1305.8	0.013792	.0023774	0.285	0.0	0.000000	0.013792
1677B	54.2	1.476	1306.2	0.013649	.0023503	0.284	0.0	0.000000	0.013649
1678A	63.3	2.278	1305.9	0.015929	.0036280	0.337	0.0	0.000000	0.015929
1678B	66.4	2.363	1307.2	0.016679	.0037562	0.337	0.0	0.000000	0.016679
1679A	53.3	1.399	1307.4	0.013399	.0022234	0.271	0.0	0.000000	0.013399
1679B	53.9	1.416	1306.5	0.013553	.0022528	0.271	0.0	0.000000	0.013553
1680A	34.4	0.761	1306.2	0.008666	.0012120	0.202	0.0	0.000000	0.008666
1680B	35.2	0.776	1306.3	0.008855	.0012349	0.202	0.0	0.000000	0.008855
1681A	18.1	0.414	1305.0	0.004554	.0006607	0.110	0.0	0.000000	0.004554
1681B	17.9	0.409	1305.4	0.004517	.0006523	0.110	0.0	0.000000	0.004517

APPENDIX C

MAIN ROTOR PERFORMANCE PLOTS

Plots of main rotor performance are presented in this appendix. The plots are ordered by run number. A summary of test runs is presented in Table B-I. Configuration codes and grid points are presented in Figures A-9 and A-10. Two plots are shown for each main rotor case. The first is a plot of the variation of power with thrust, expressed in the non-dimensional coefficients C_p and C_T. Discrete test data points for both the interaction mode (both rotors operating) and isolated mode (tail rotor stopped) are included on each plot along with the respective regression curve fits. The second plot shows the interaction effects on main rotor power, expressed as the power ratio $C_{p_{M/R}}$ (Interaction)/$C_{p_{M/R}}$ (Isolated), versus thrust coefficient. This power ratio is derived from the curve fits of C_p versus C_T. The model used for the regression curve fits was $C_p = a_o + a_1 C_T 3/2$ (ref. p. A-20.) The average standard derivation of main rotor C_p (measured value versus curve fit) for all of the C_p-C_T curve fits of Appendix C was 1.3% of the mean C_p. The average mean C_p was approximately .003.

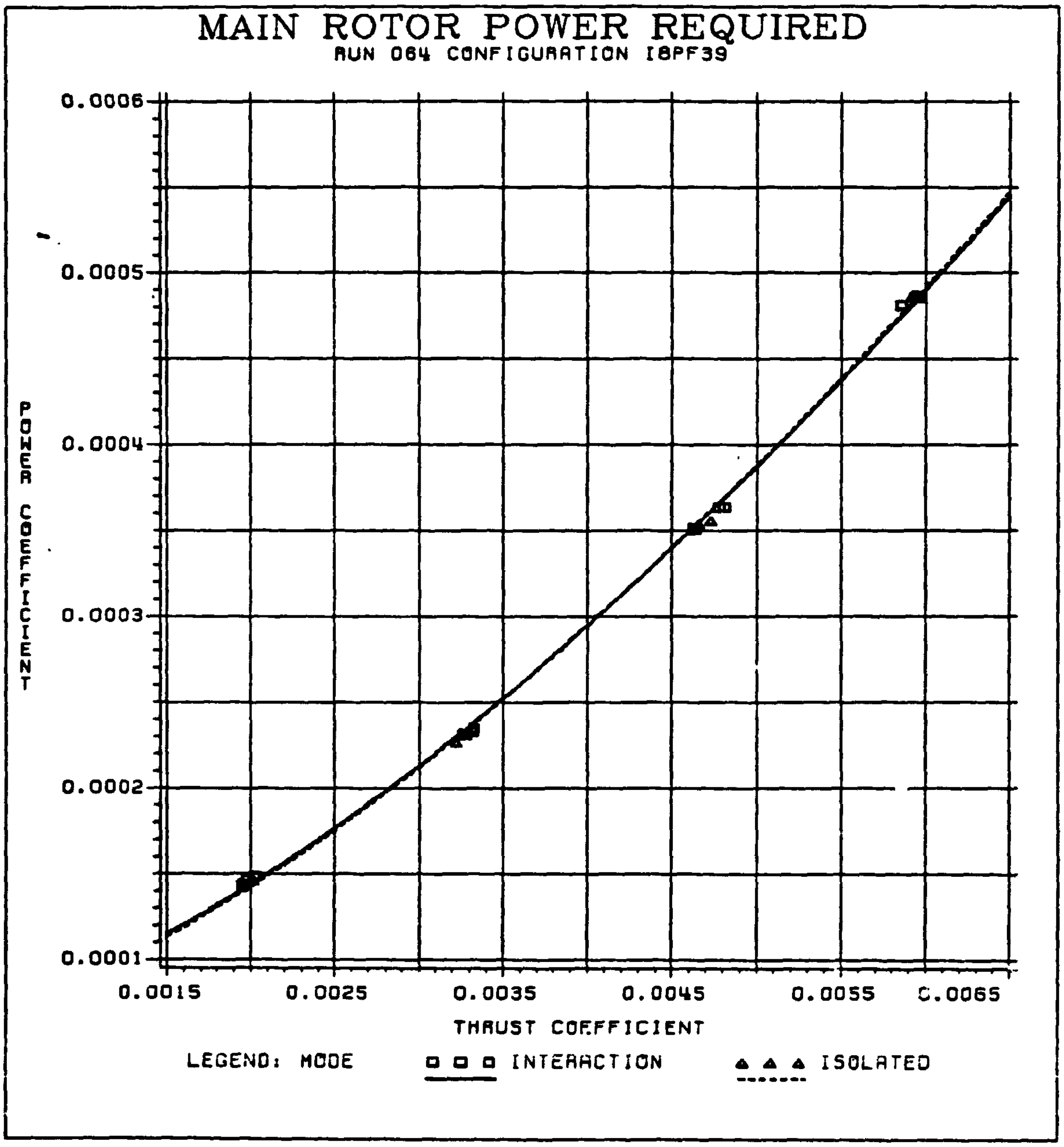
Due to equipment problems, Run 092 was cut short. Insufficient data was obtained for isolated main rotor operation during this run to enable a satisfactory curve fit of that portion of the data.

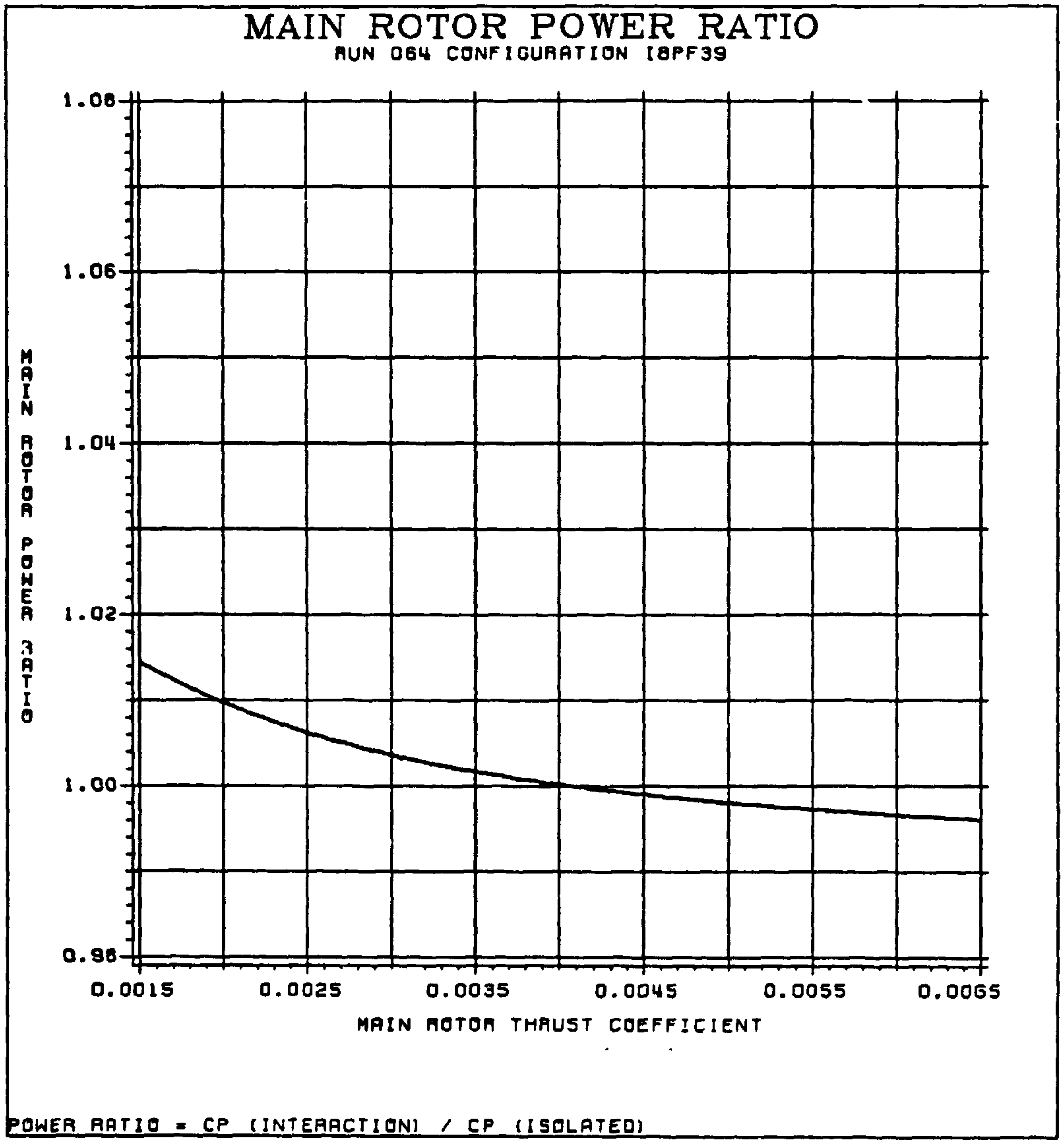
Dependent on tail rotor location and fin blockage, tail rotor stall occurred during the main rotor thrust sweeps with yaw trim. Table C-I shows the calculated main rotor C_p at the onset of tail rotor stall. Tail rotor stall is determined from the main-rotor-off data of Figures 11 and 12. The $C_{T_{NET}}$ at which tail rotor stall occurred in the presence of the main rotor wake may differ from the main-rotor-off cases. However, the tail rotor stall point for main-rotor-on cases was not defined due to an insufficient number of data points for these cases.

TABLE C-I. CALCULATED $C_{p_{M/R}} \times 10^5$ AT ONSET OF T/R STALL*

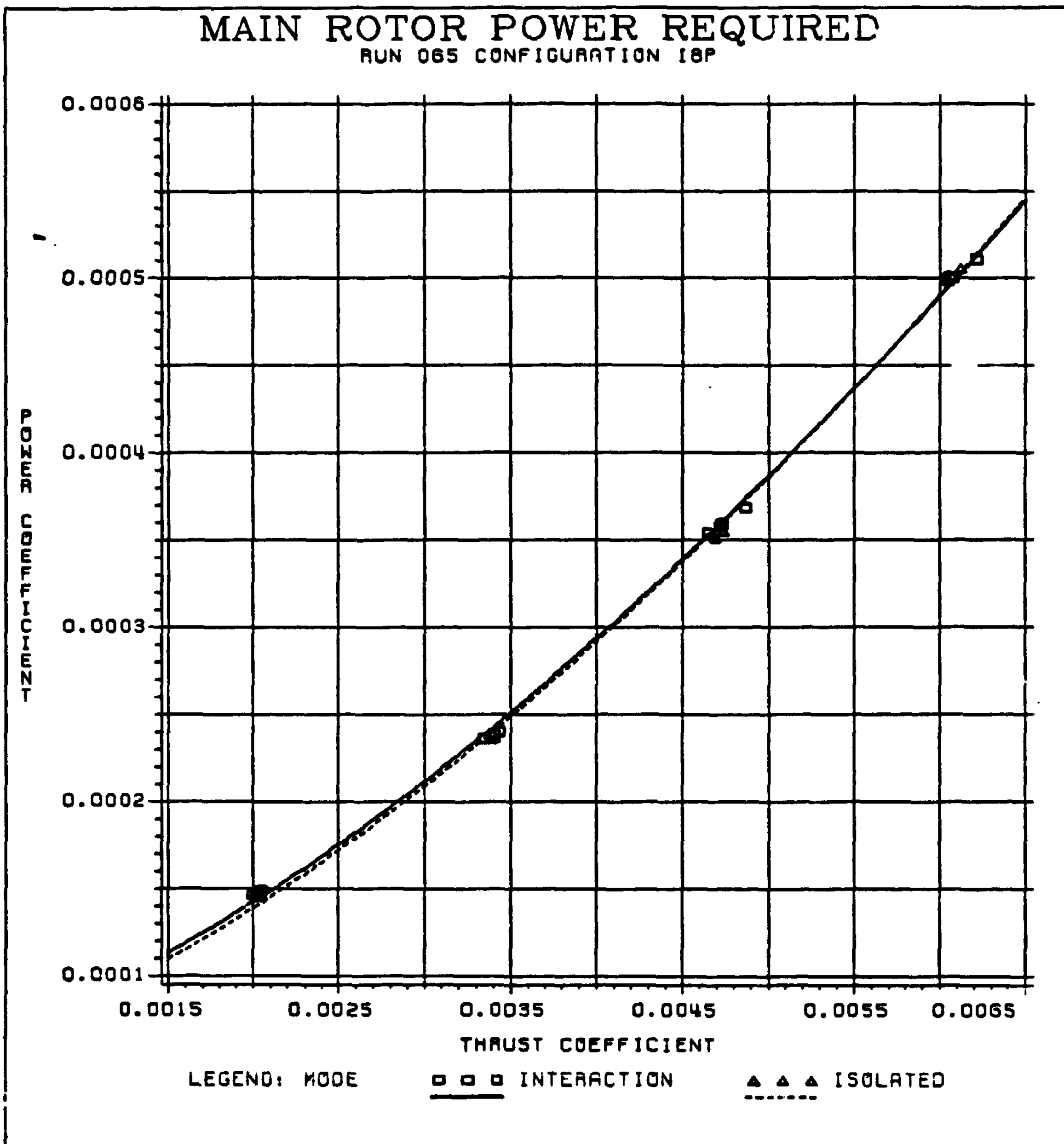
Location of T/R Hub (aft of M/R tip)	S/A for Pusher T/R			S/A for Tractor T/R		
	0.0	.18	.39	0.0	.18	.39
1.1r	37.45	35.89	32.77	40.57	37.45	31.21
1.6r	40.17	38.50	35.15	43.52	40.13	33.47
2.1r	42.89	41.10	37.53	46.46	42.89	35.74

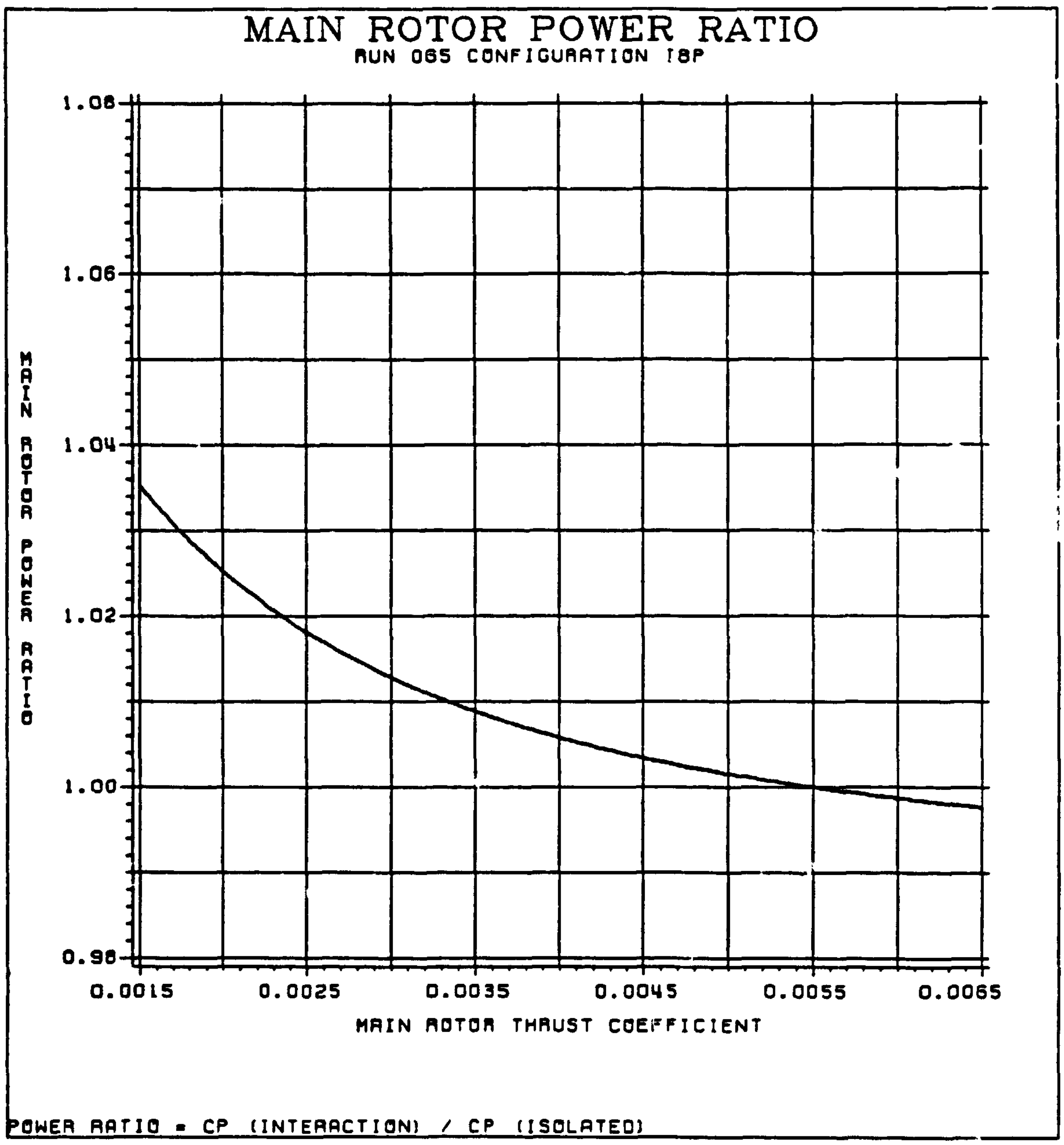
* Tail rotor stall as determined with main rotor off (Figs. 11 and 12)


MAIN ROTOR POWER REQUIRED
RUN 064 CONFIGURATION I8PF39
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
POWER COEFFICIENT
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
THRUST COEFFICIENT
LEGEND: MODE
INTERACTION
ISOLATED

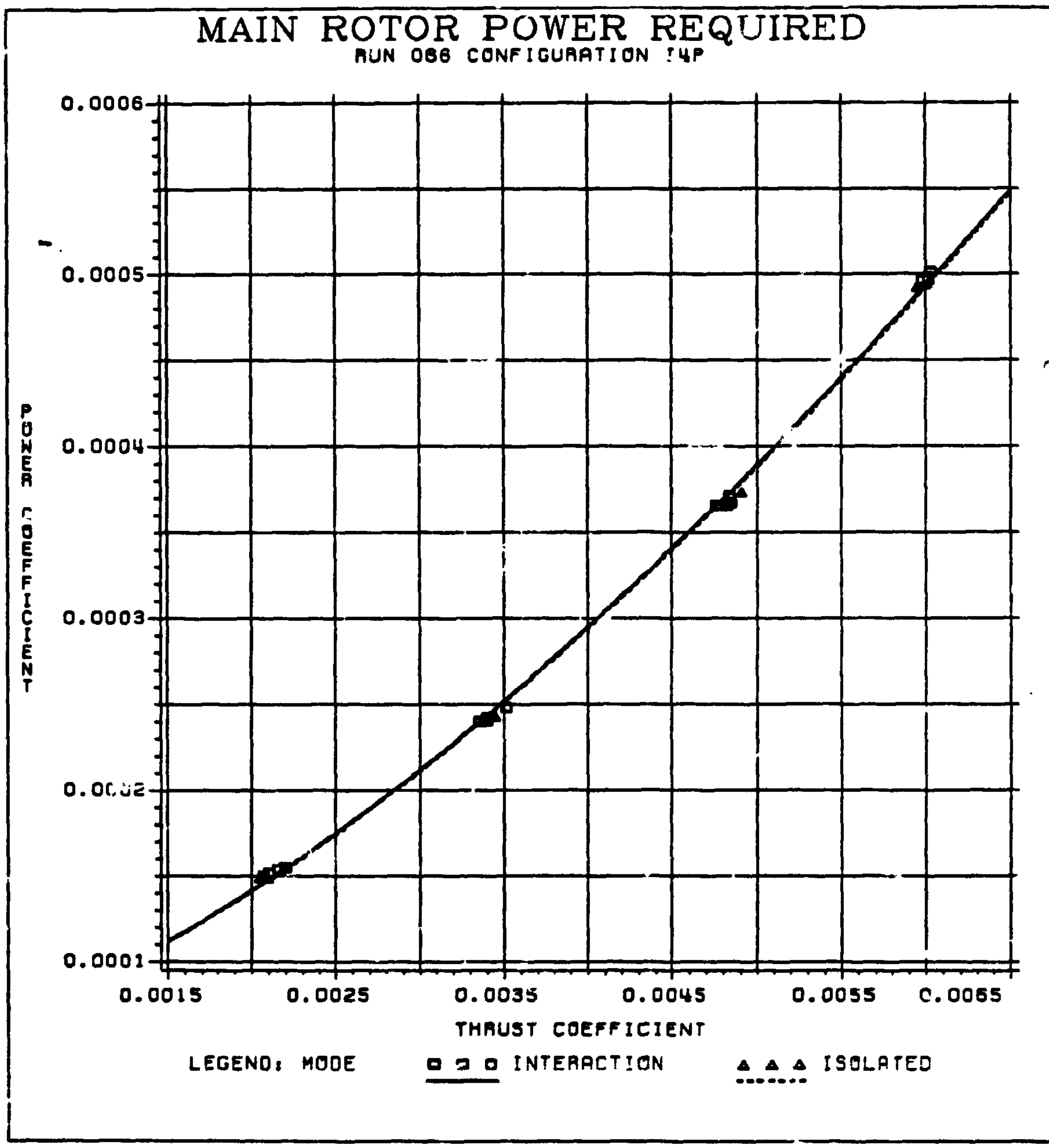

MAIN ROTOR POWER RATIO
RUN 064 CONFIGURATION I8PF39
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

ORIGINAL PAGE IS
OF POOR QUALITY



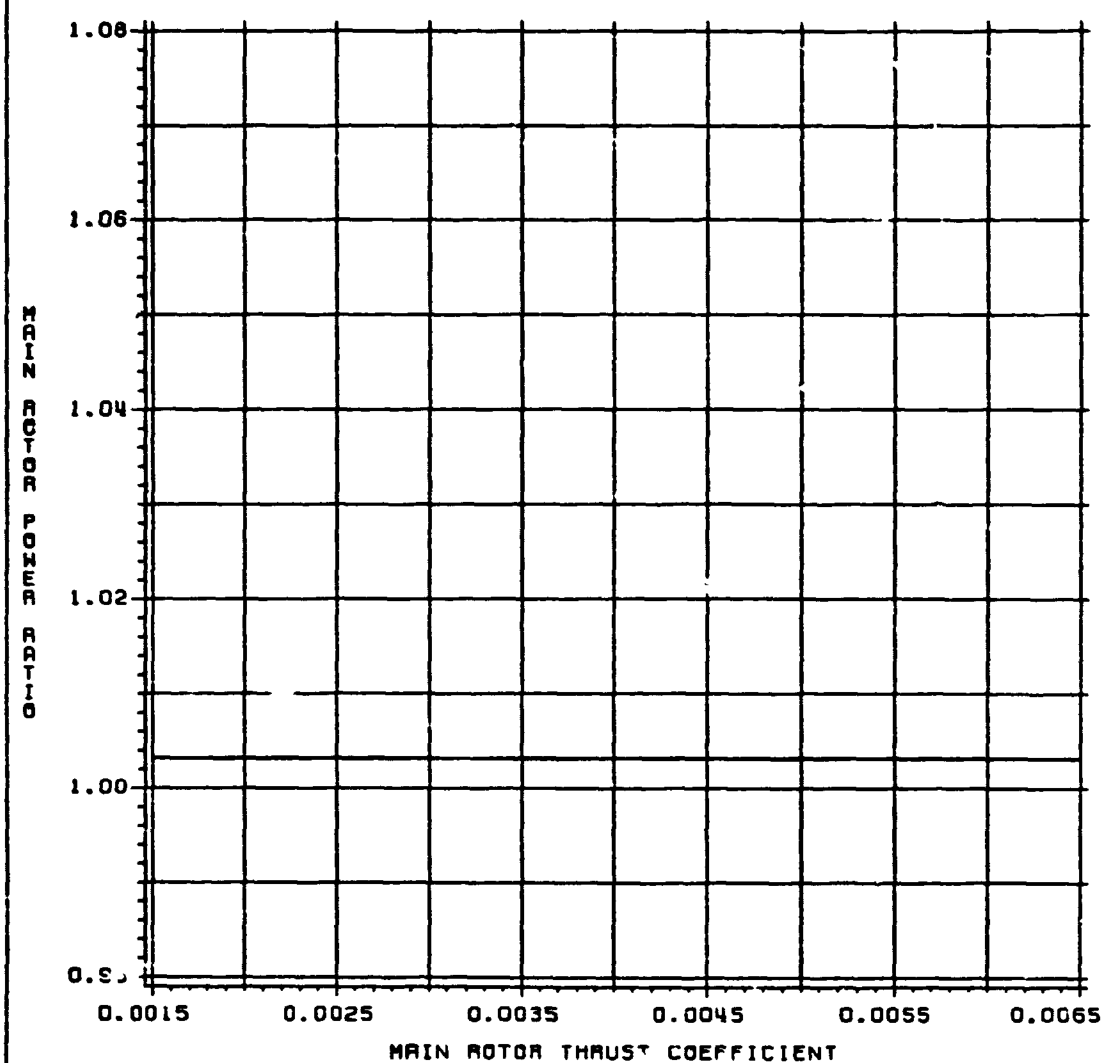

MAIN ROTOR POWER RATIO
RUN 065 CONFIGURATION I8P
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

ORIGINAL PAGE IS
OF POOR QUALITY



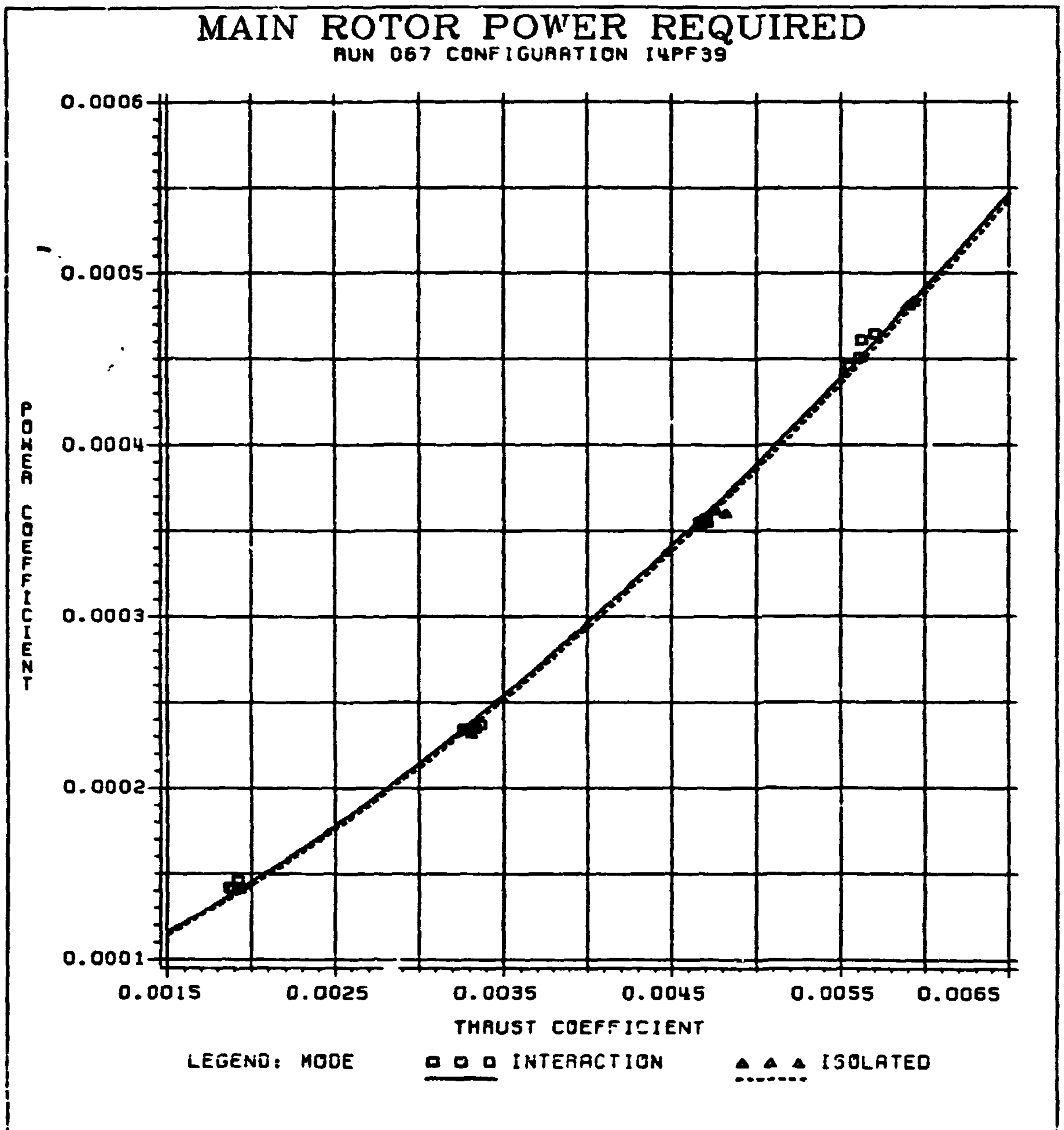
MAIN ROTOR POWER RATIO

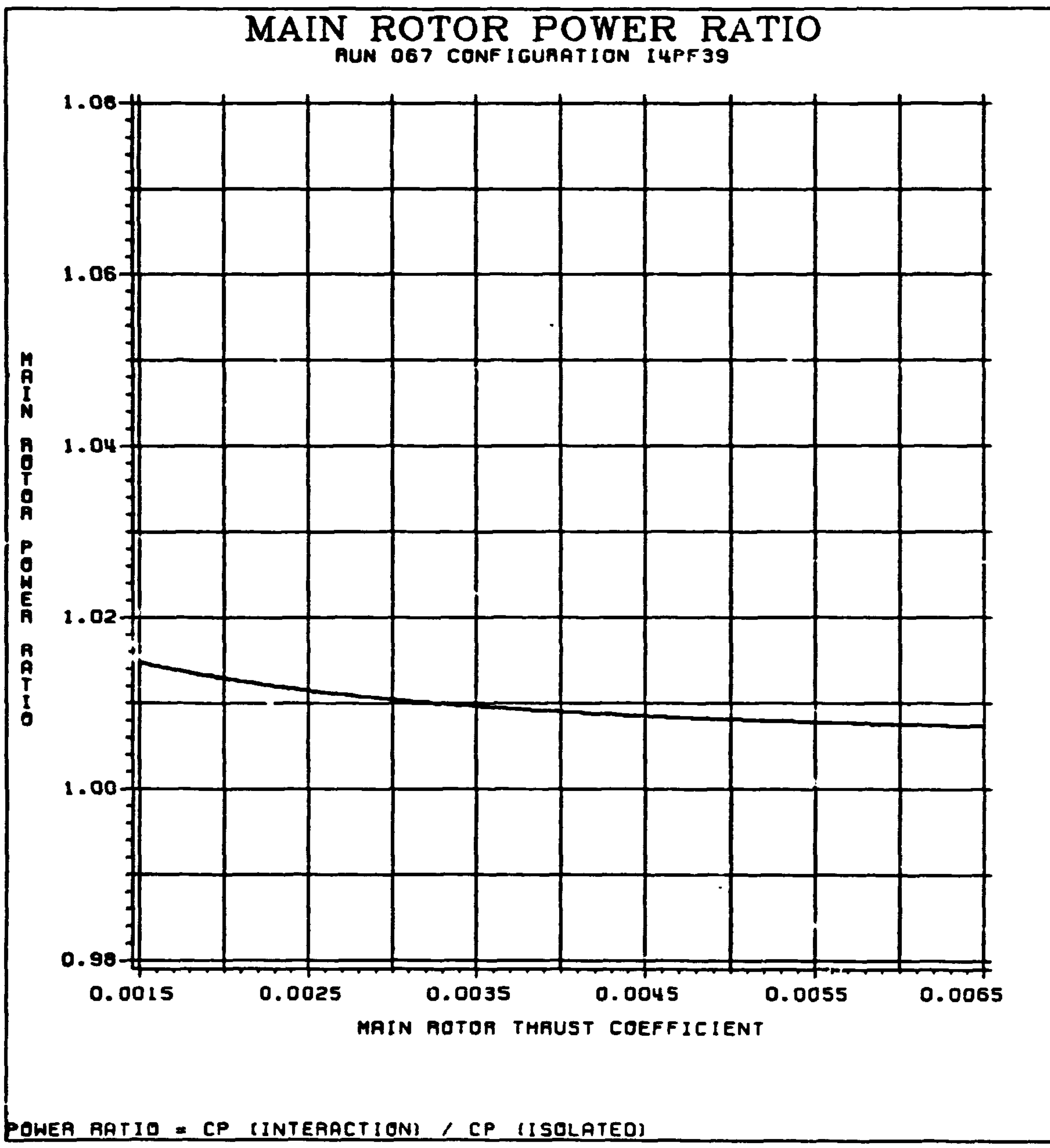
RUN 066 CONFIGURATION I4P



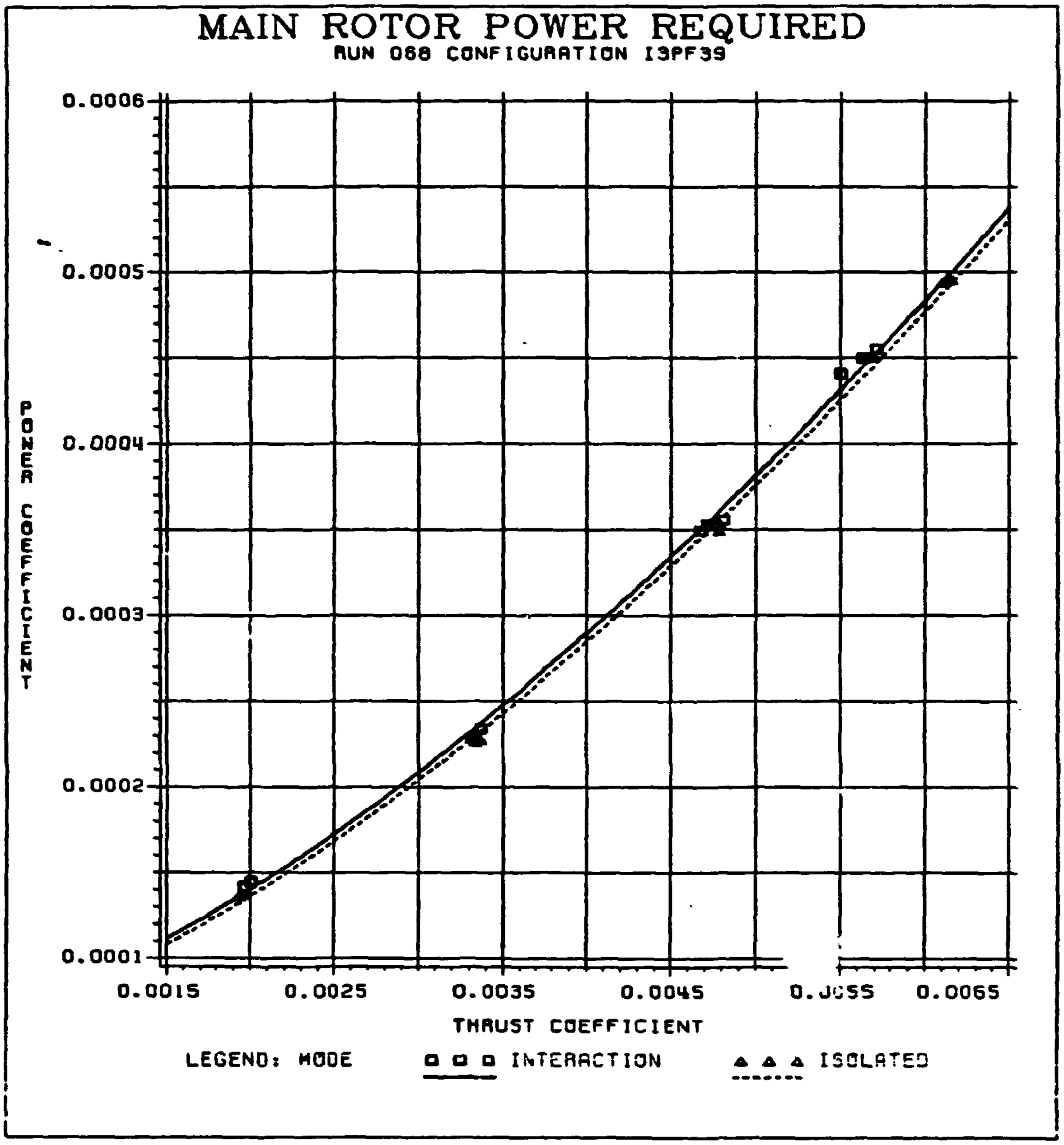
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

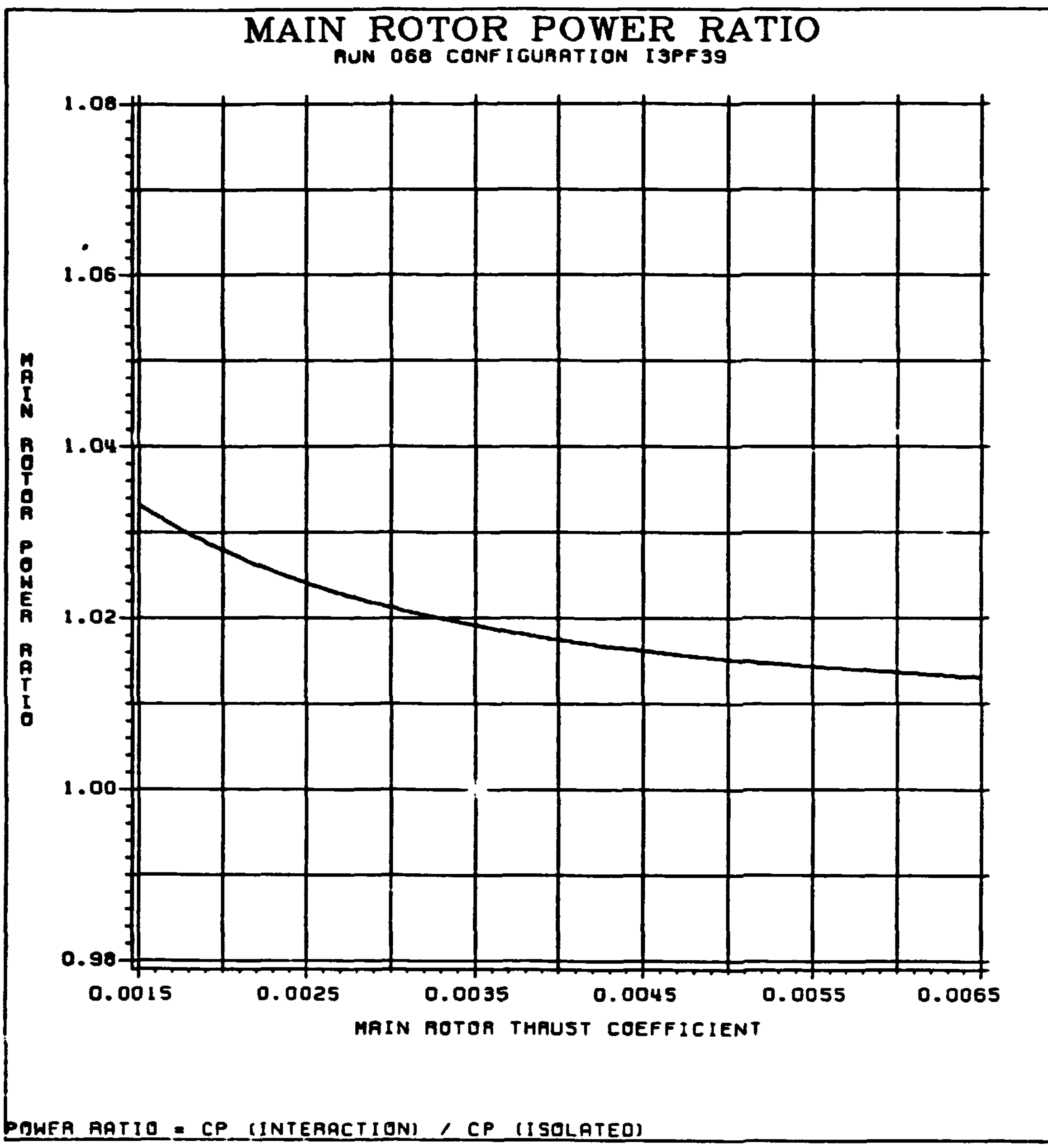
ORIGINAL PAGE IS
OF POOR QUALITY



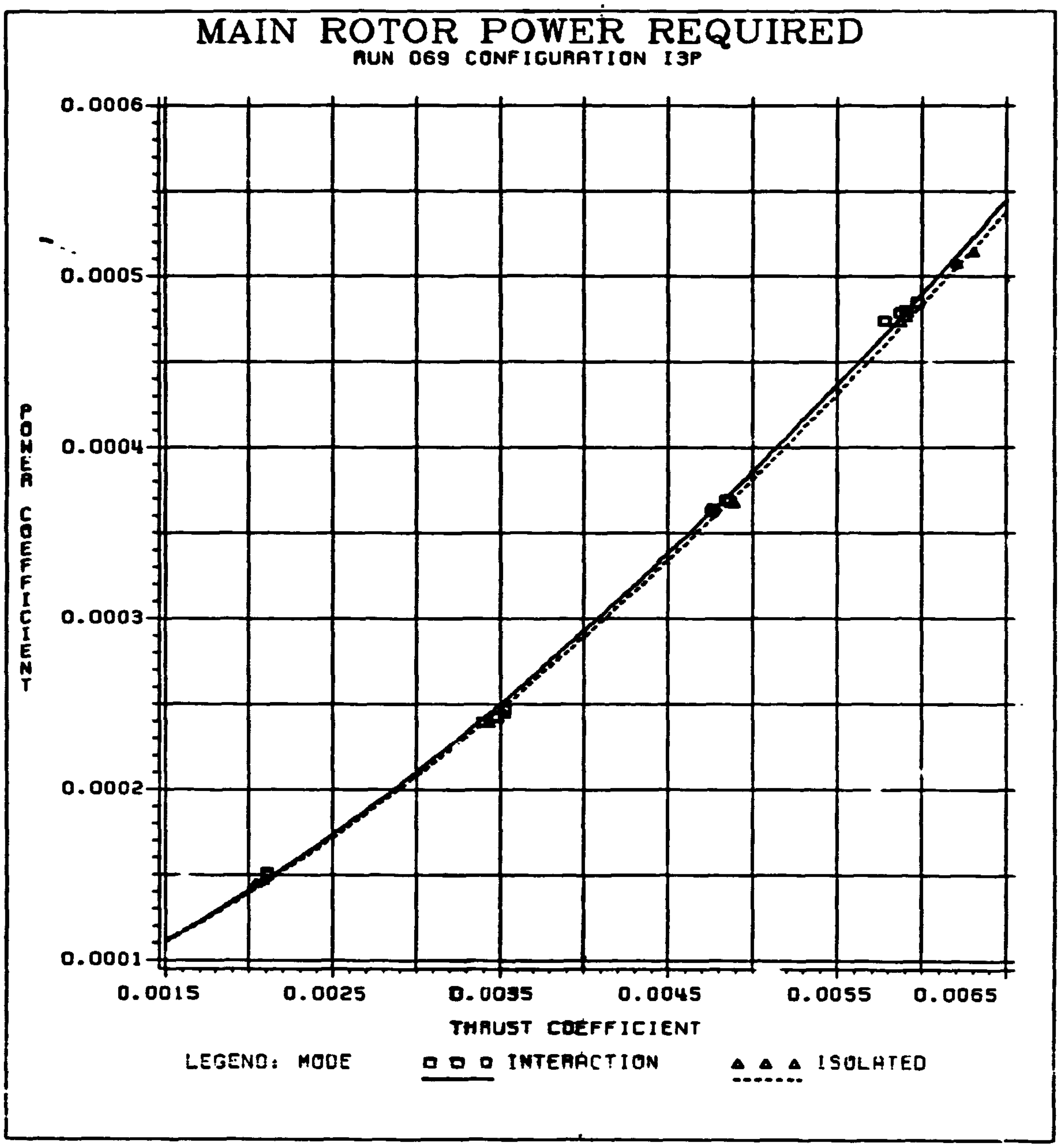

MAIN ROTOR POWER RATIO
RUN 067 CONFIGURATION I4PF39
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

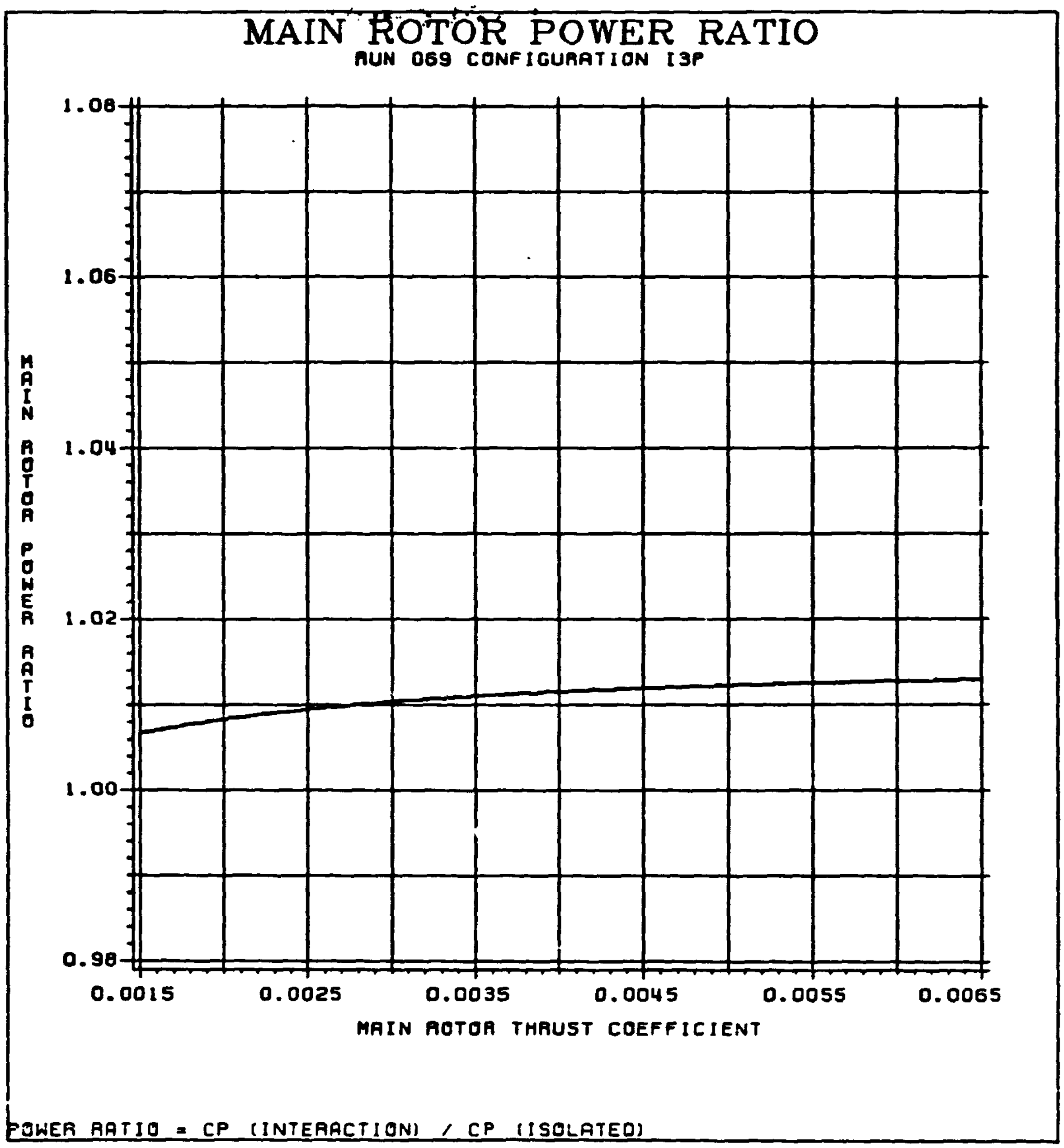
ORIGINAL PAGE IS
OF POOR QUALITY



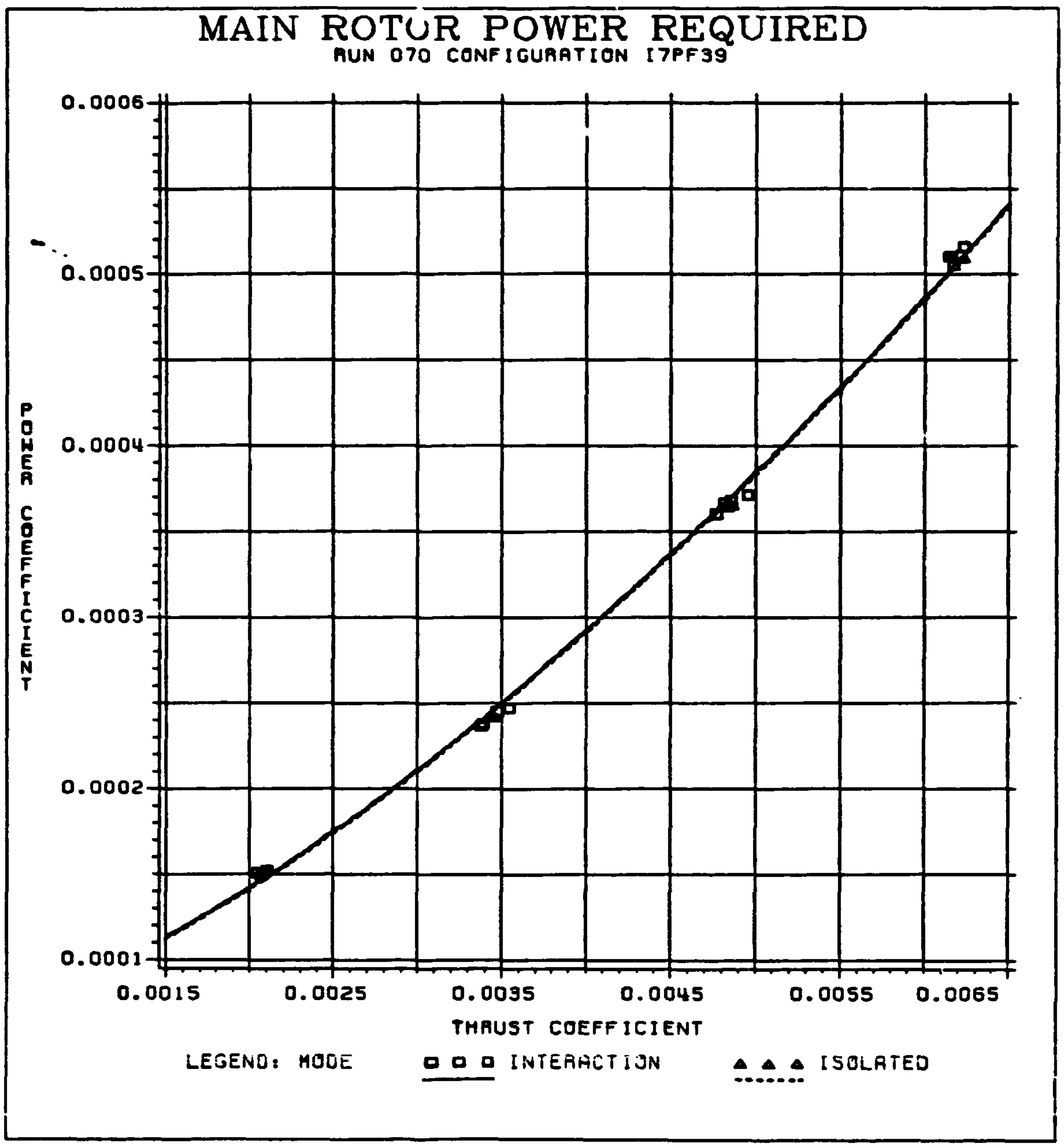

MAIN ROTOR POWER RATIO
RUN 068 CONFIGURATION I3PF39
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

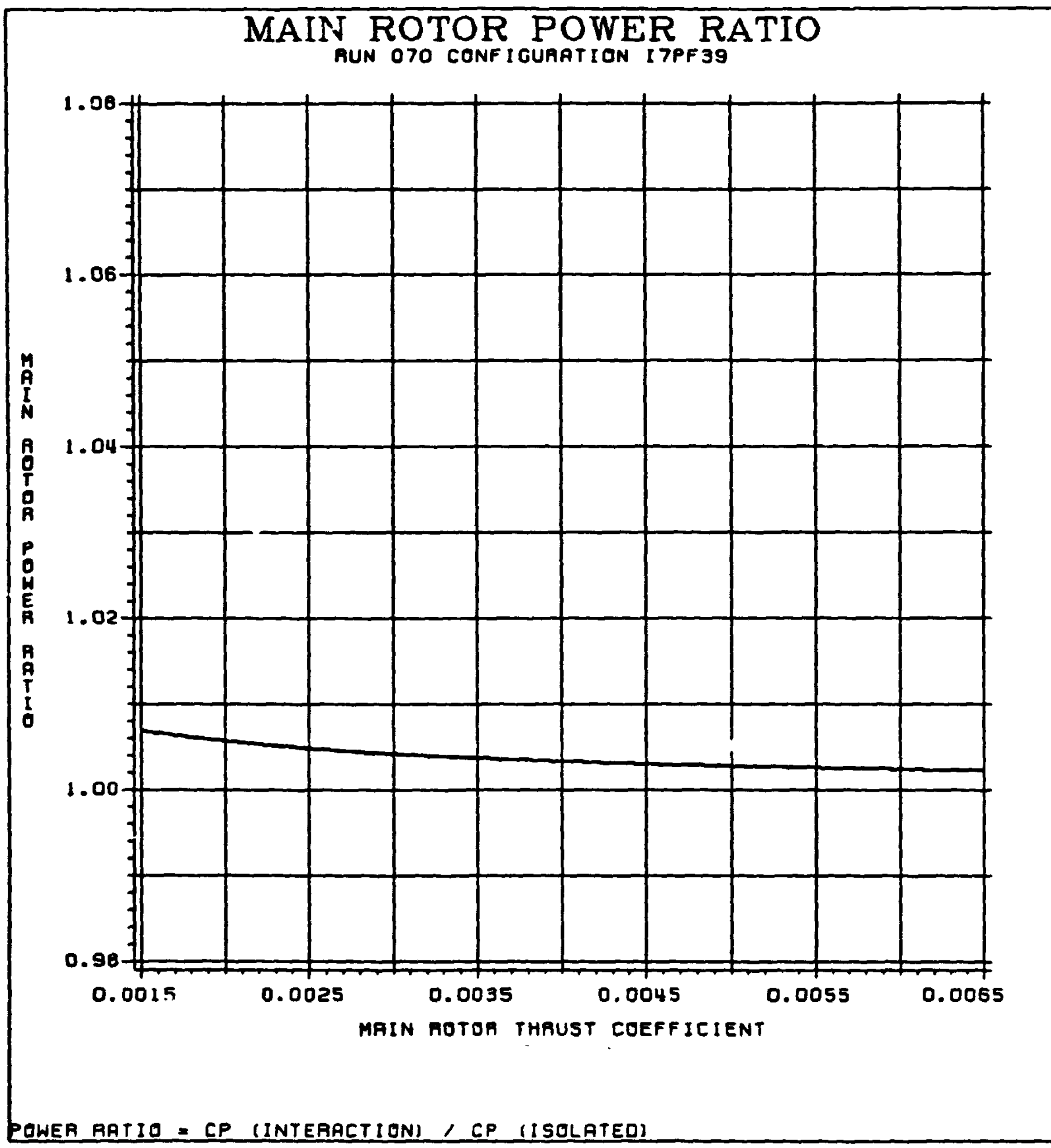
ORIGINAL PAGE IS OF POOR QUALITY



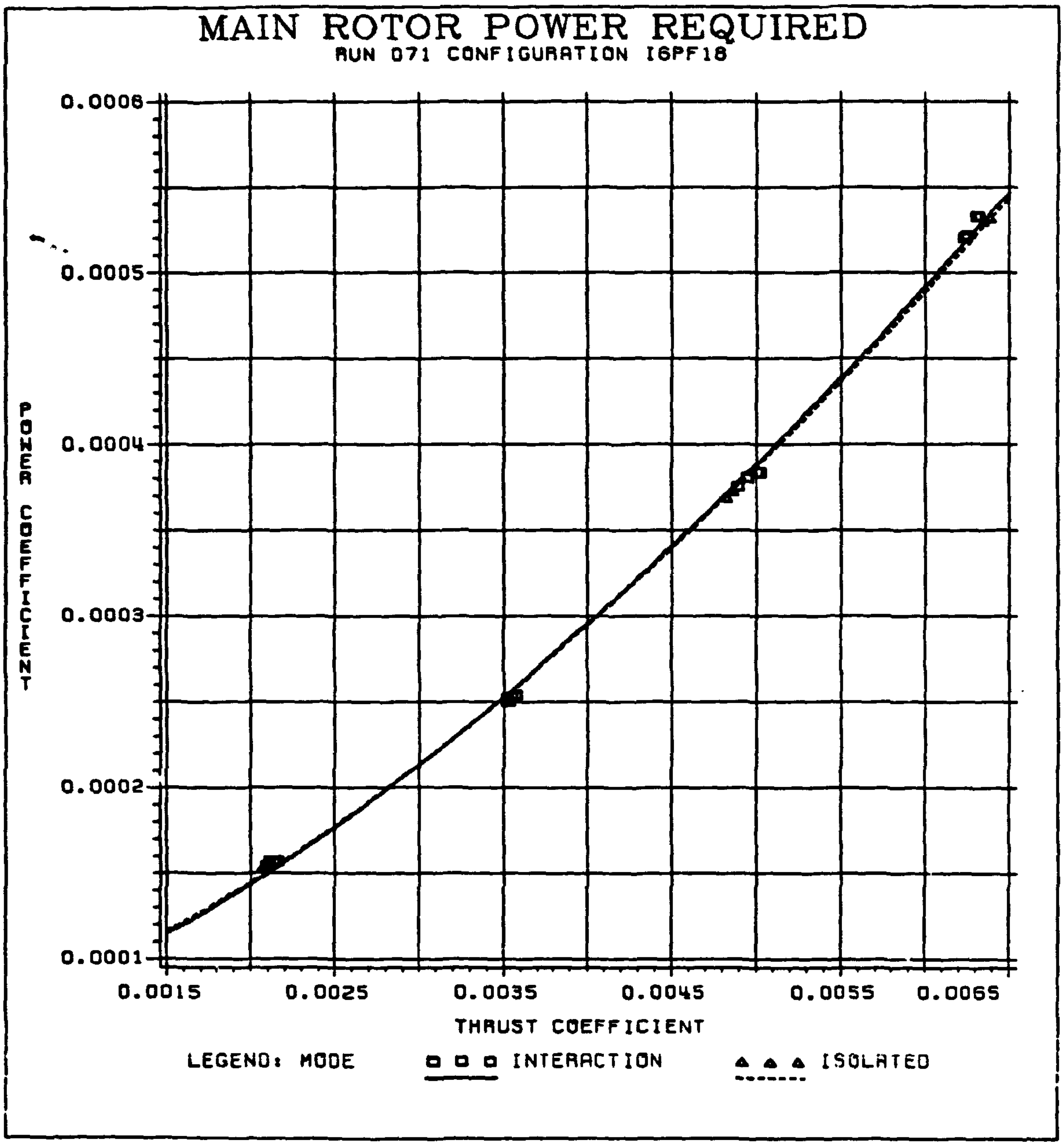

MAIN ROTOR POWER RATIO
RUN 069 CONFIGURATION I3P
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

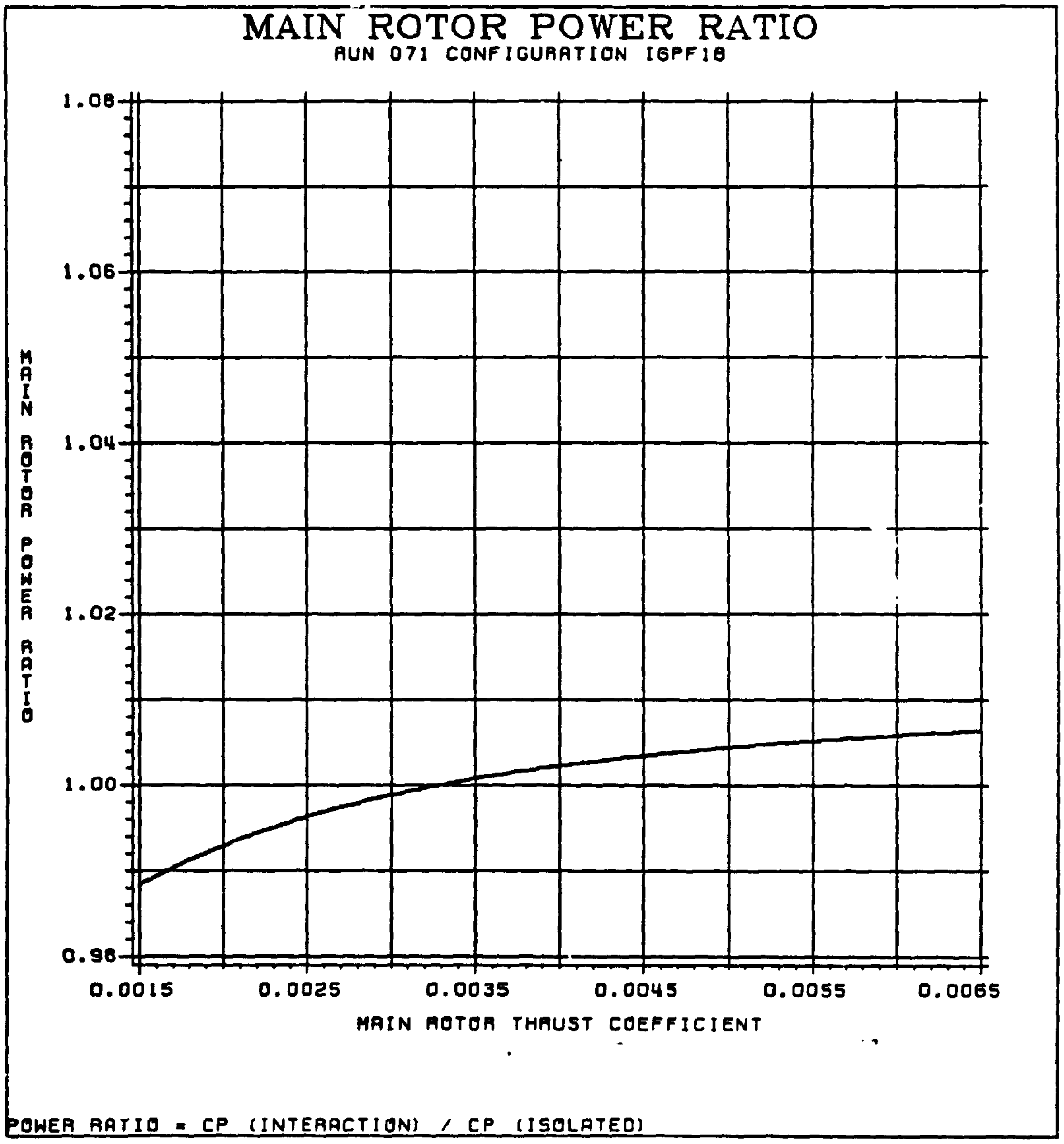
ORIGINAL PAGE IS
OF POOR QUALITY



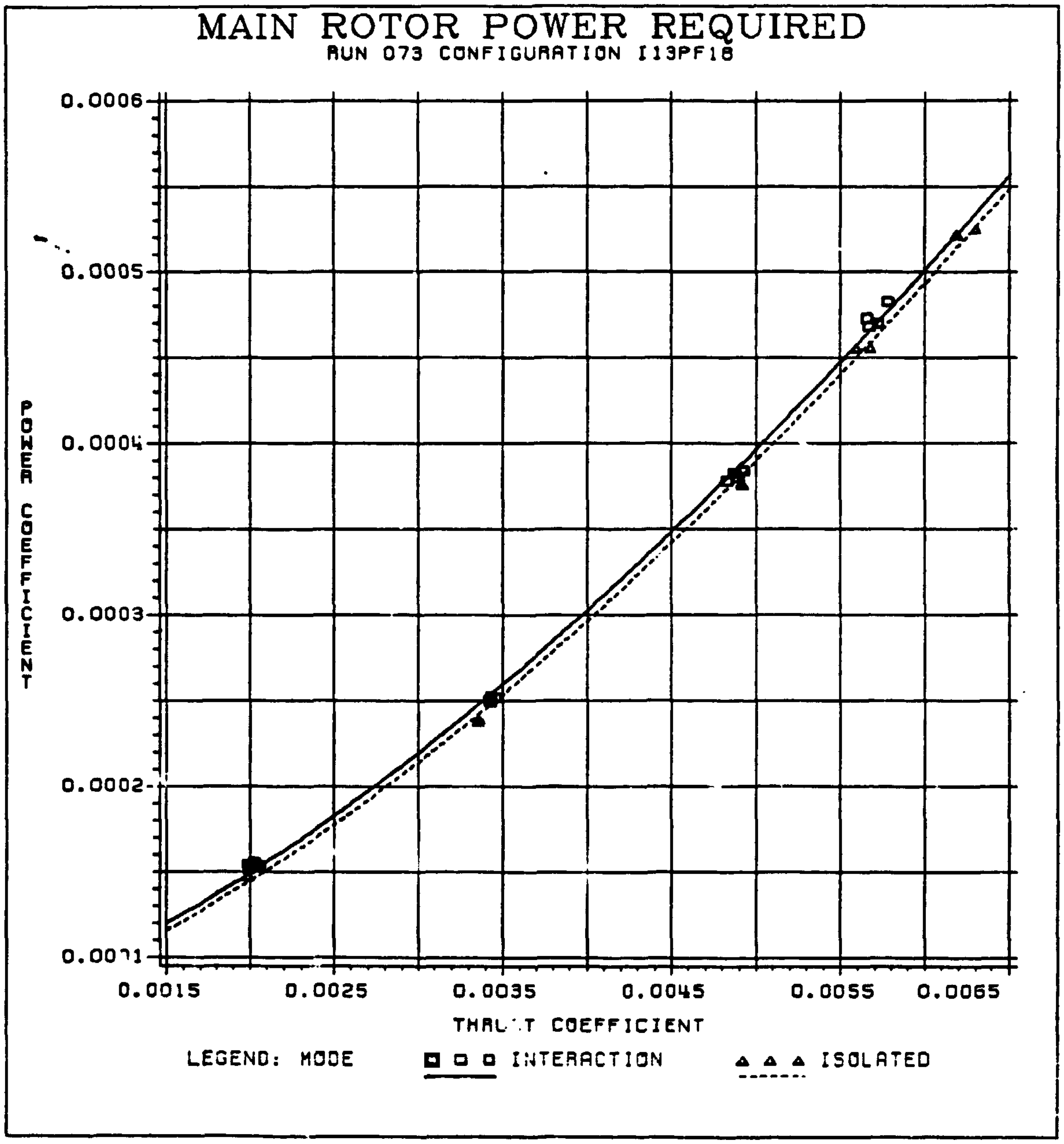

MAIN ROTOR POWER RATIO
RUN 070 CONFIGURATION I7PF39
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

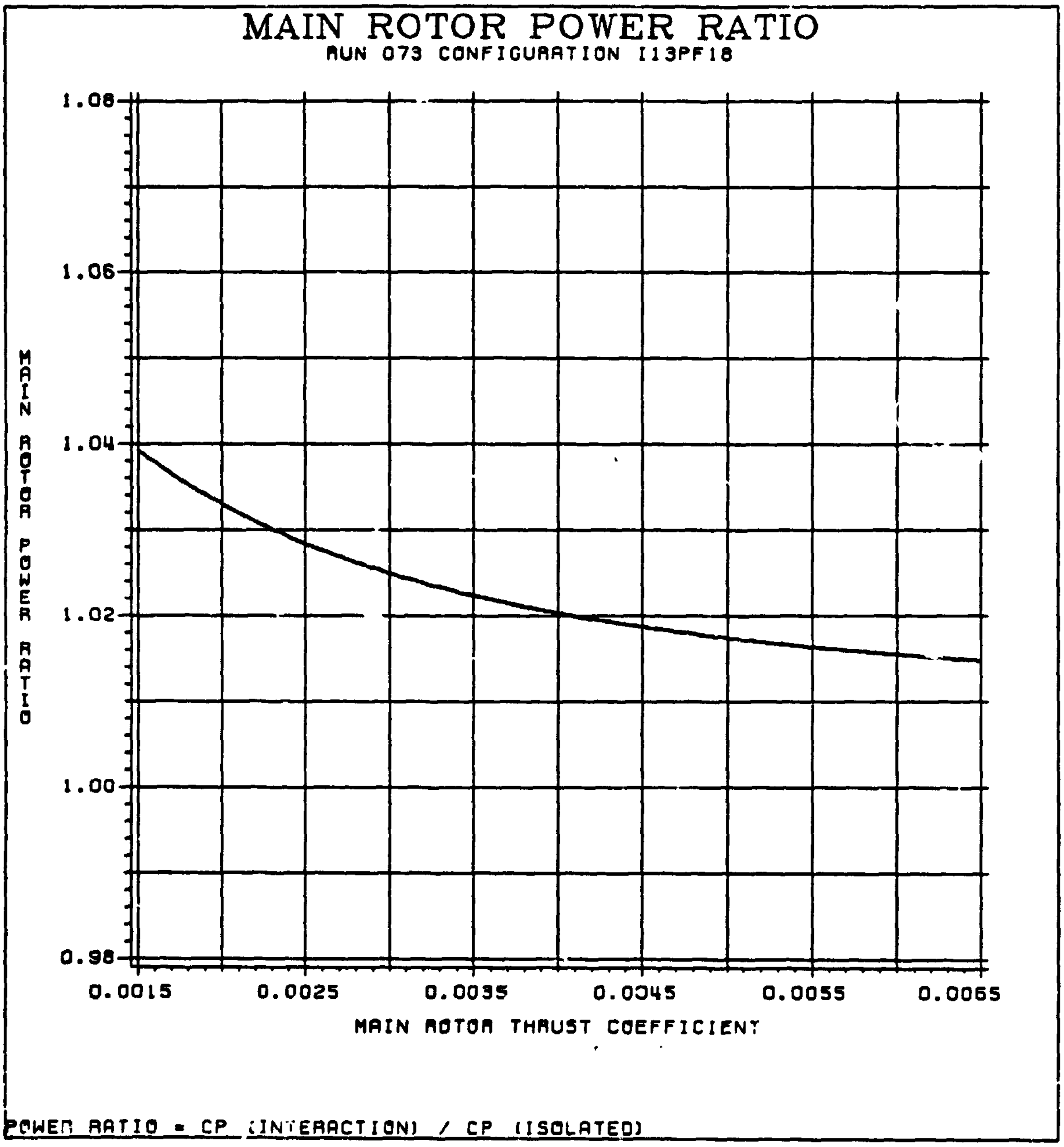
ORIGINAL PAGE IS
OF POOR QUALITY



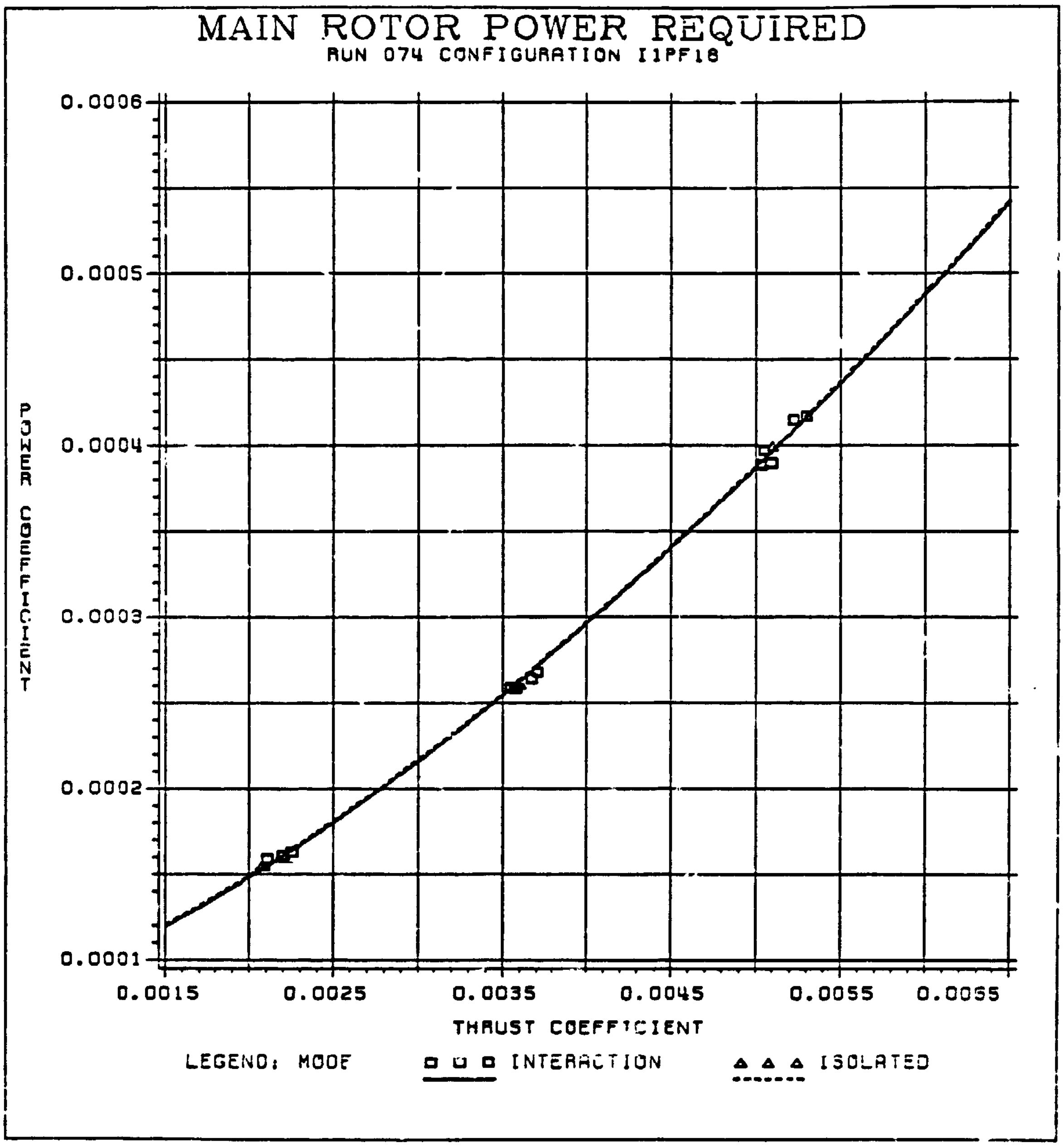

MAIN ROTOR POWER RATIO
RUN 071 CONFIGURATION IGPF18
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

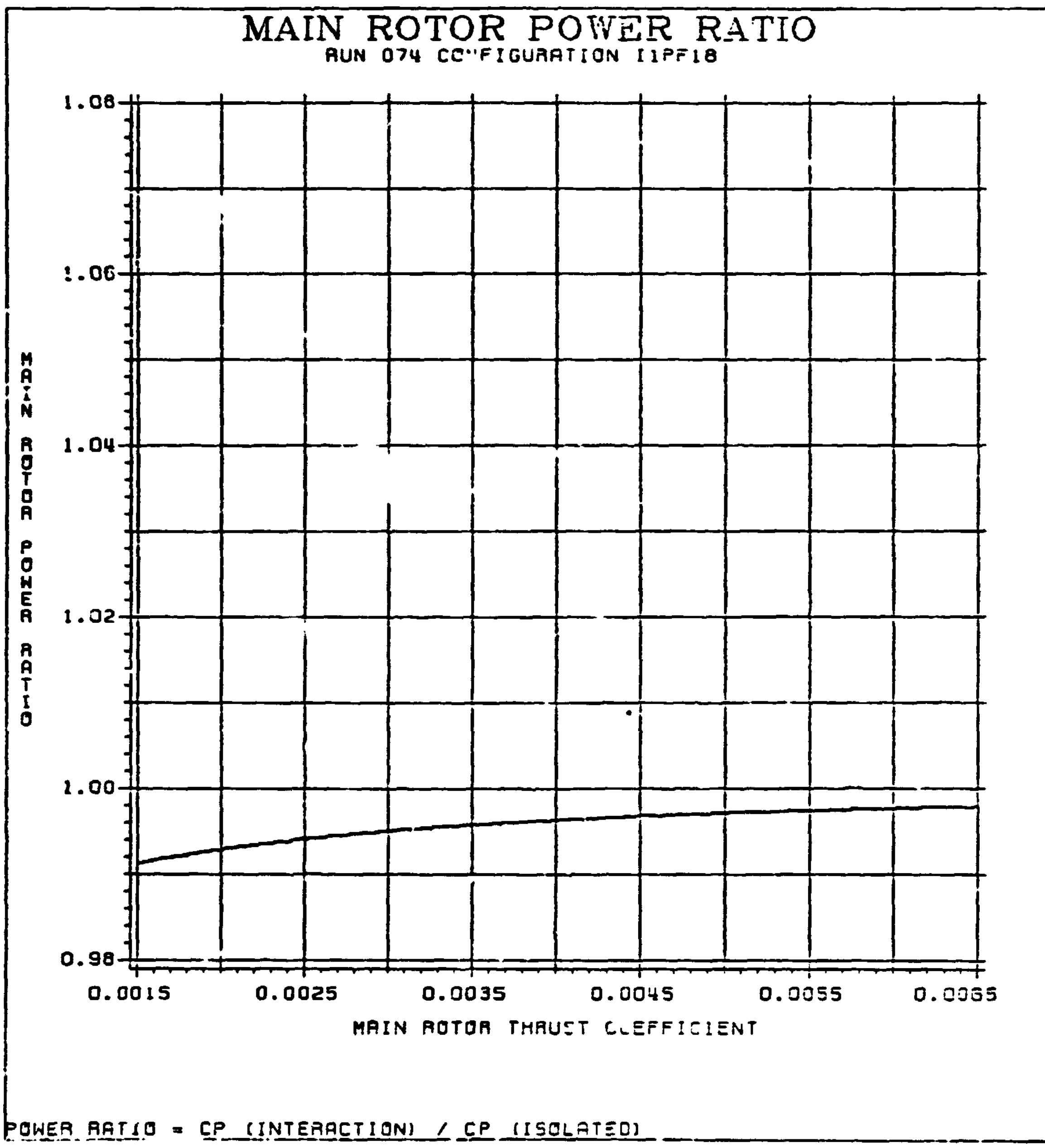
ORIGINAL PAGE IS
OF POOR QUALITY



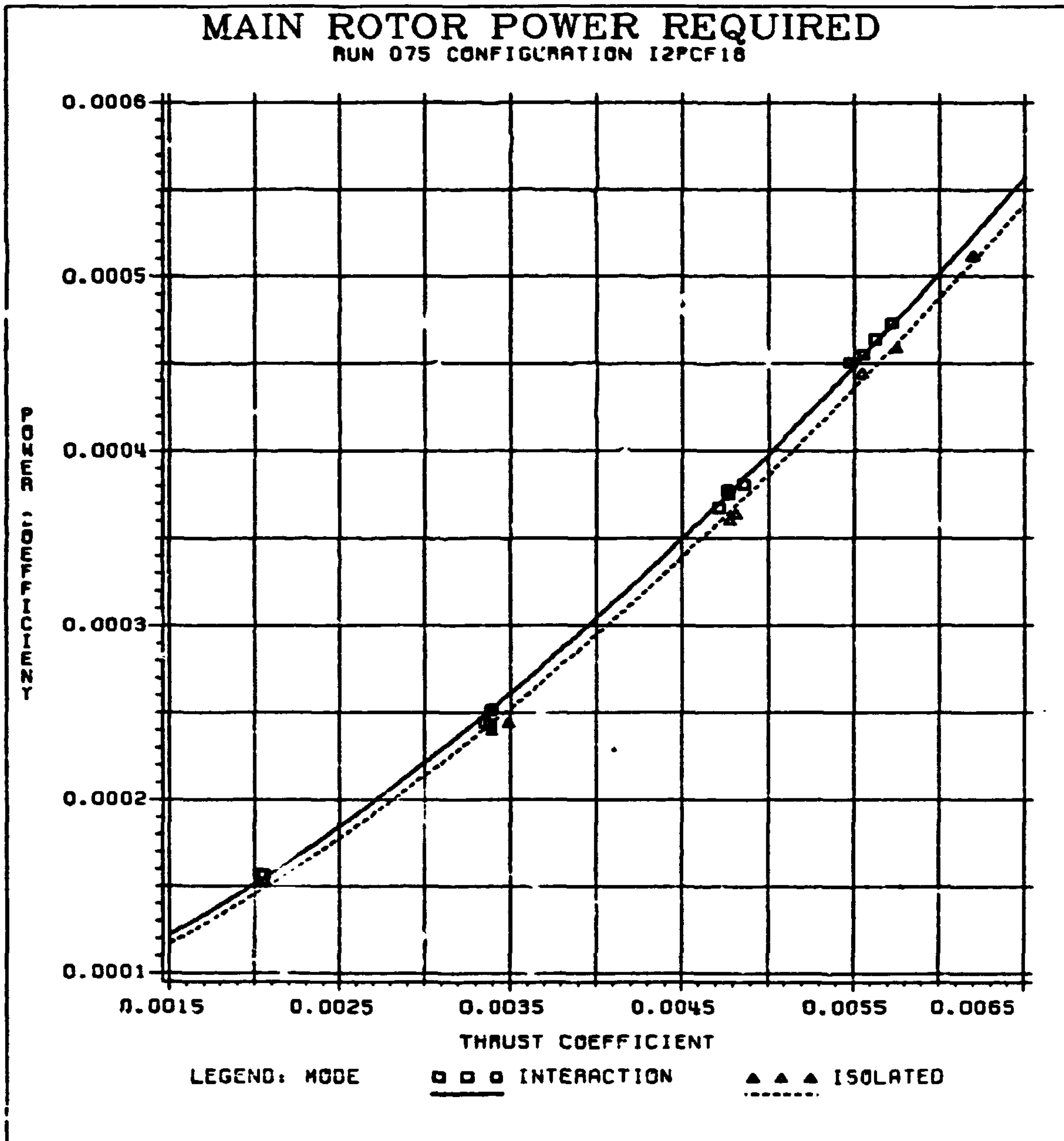

MAIN ROTOR POWER RATIO
RUN 073 CONFIGURATION I13PF18
MAIN ROTOR POWER RATIO
1.08
1.06
1.04
1.02
1.00
0.98
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

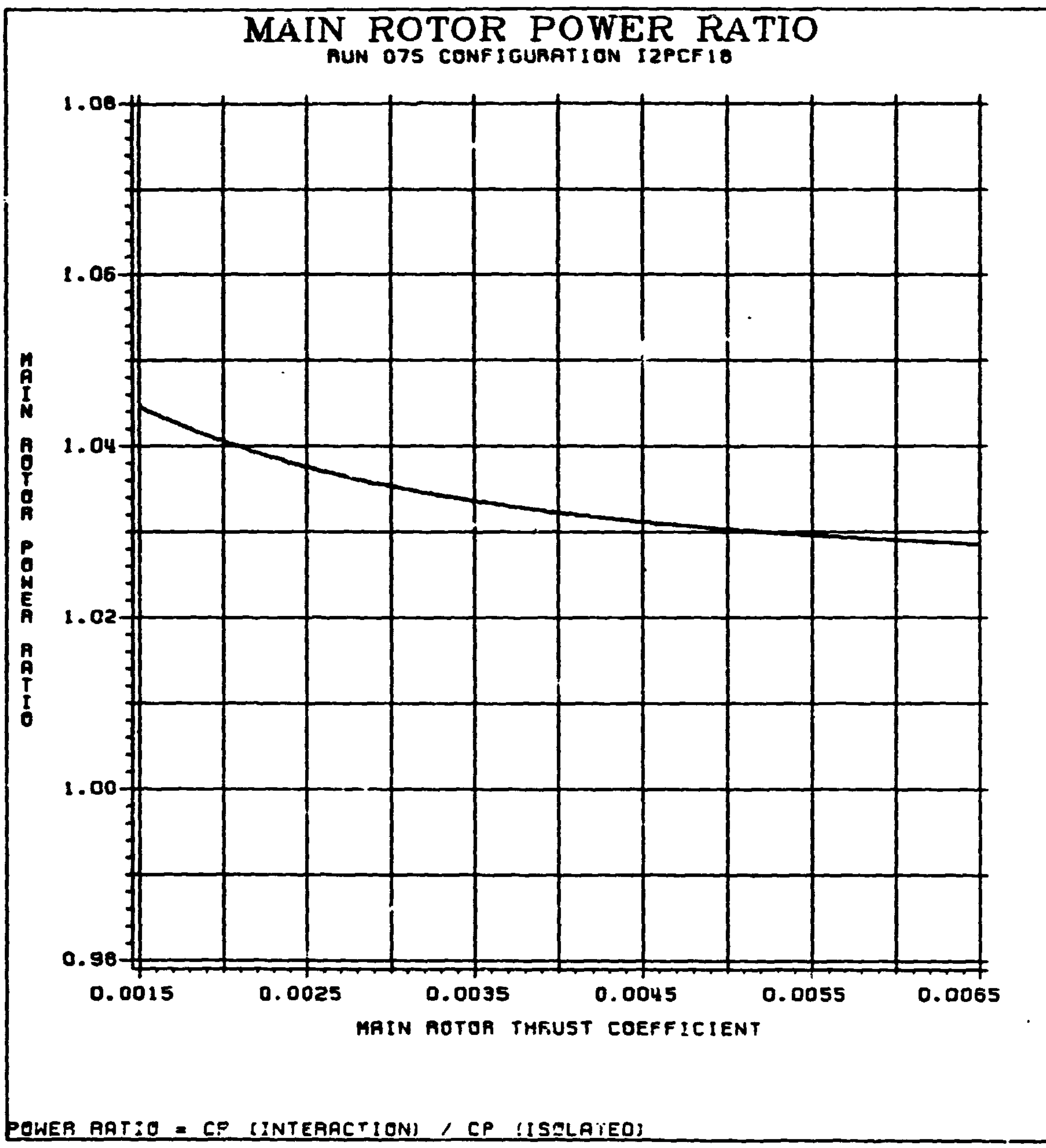
ORIGINAL PAGE IS
OF POOR QUALITY



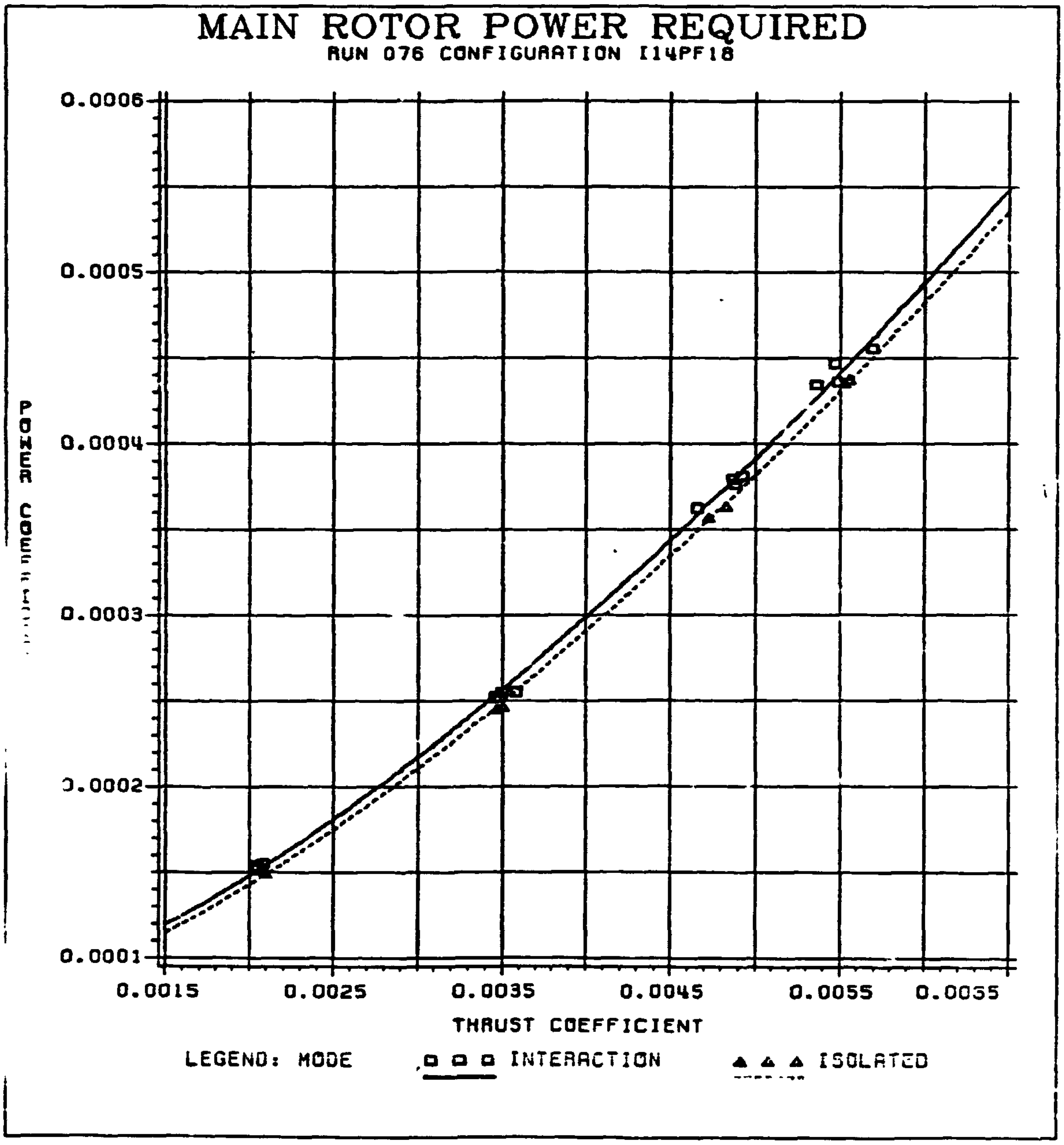

MAIN ROTOR POWER RATIO
RUN 074 CONFIGURATION I1PF18
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

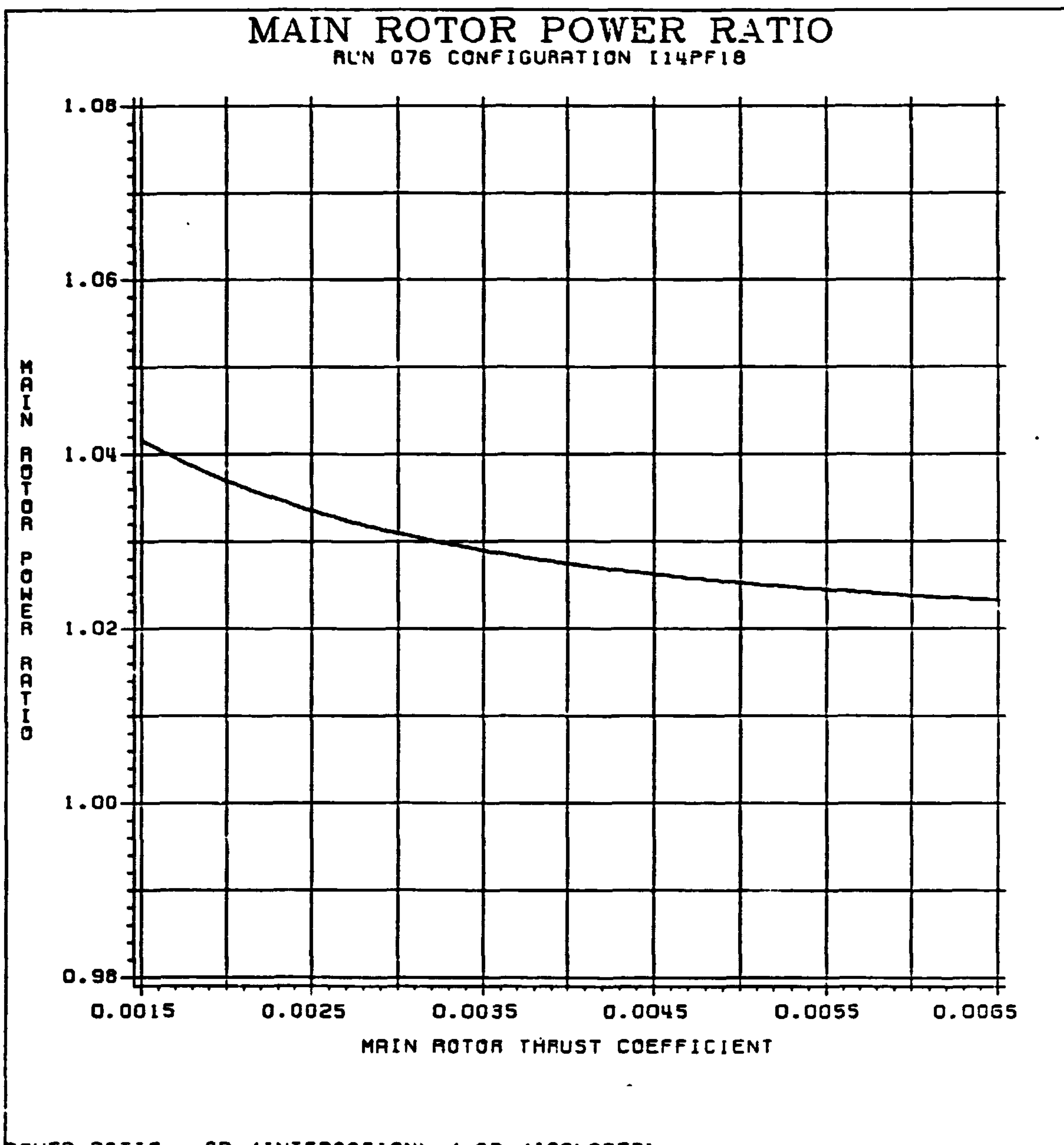
ORIGINAL PAGE IS
OF POOR QUALITY



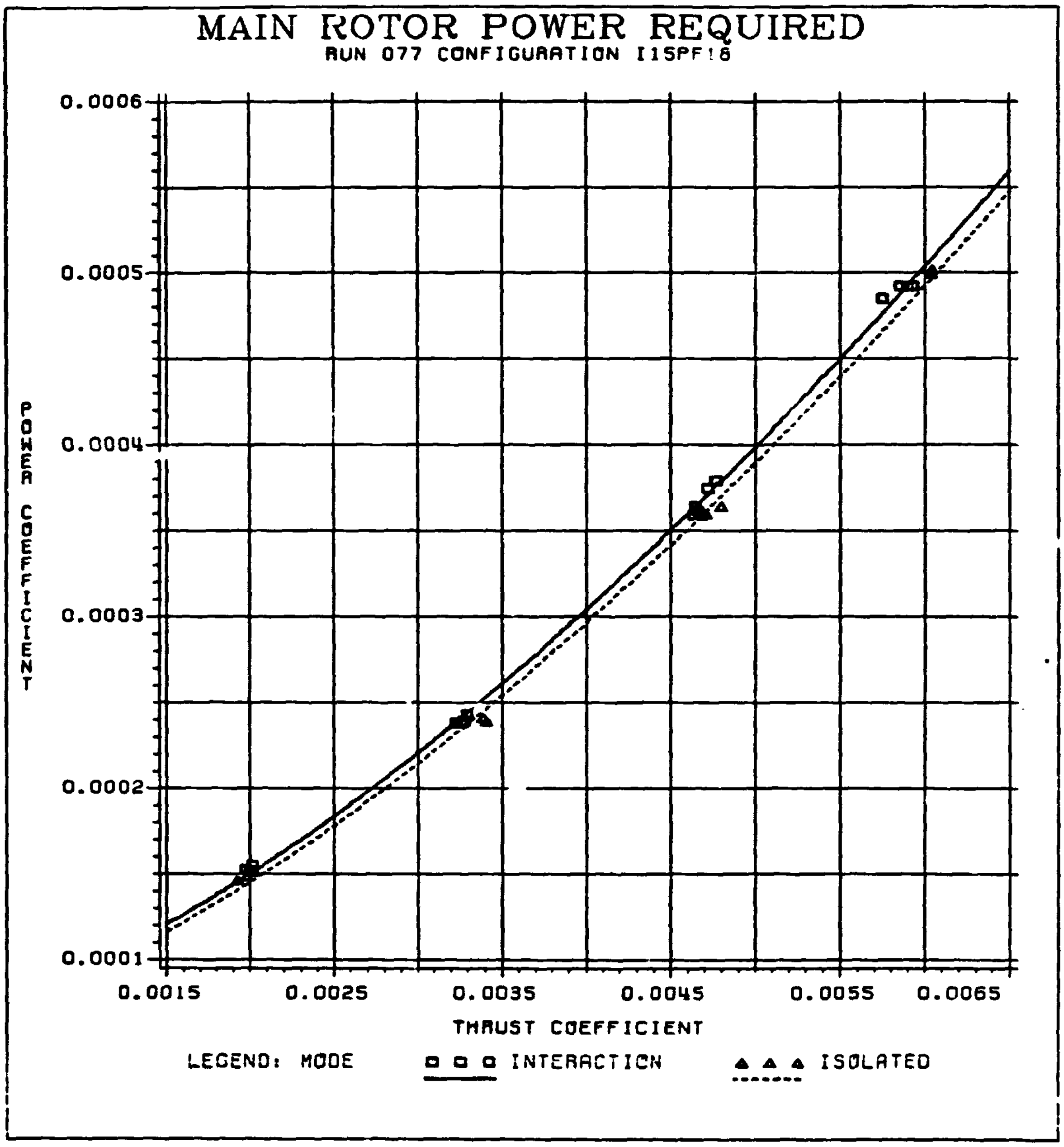


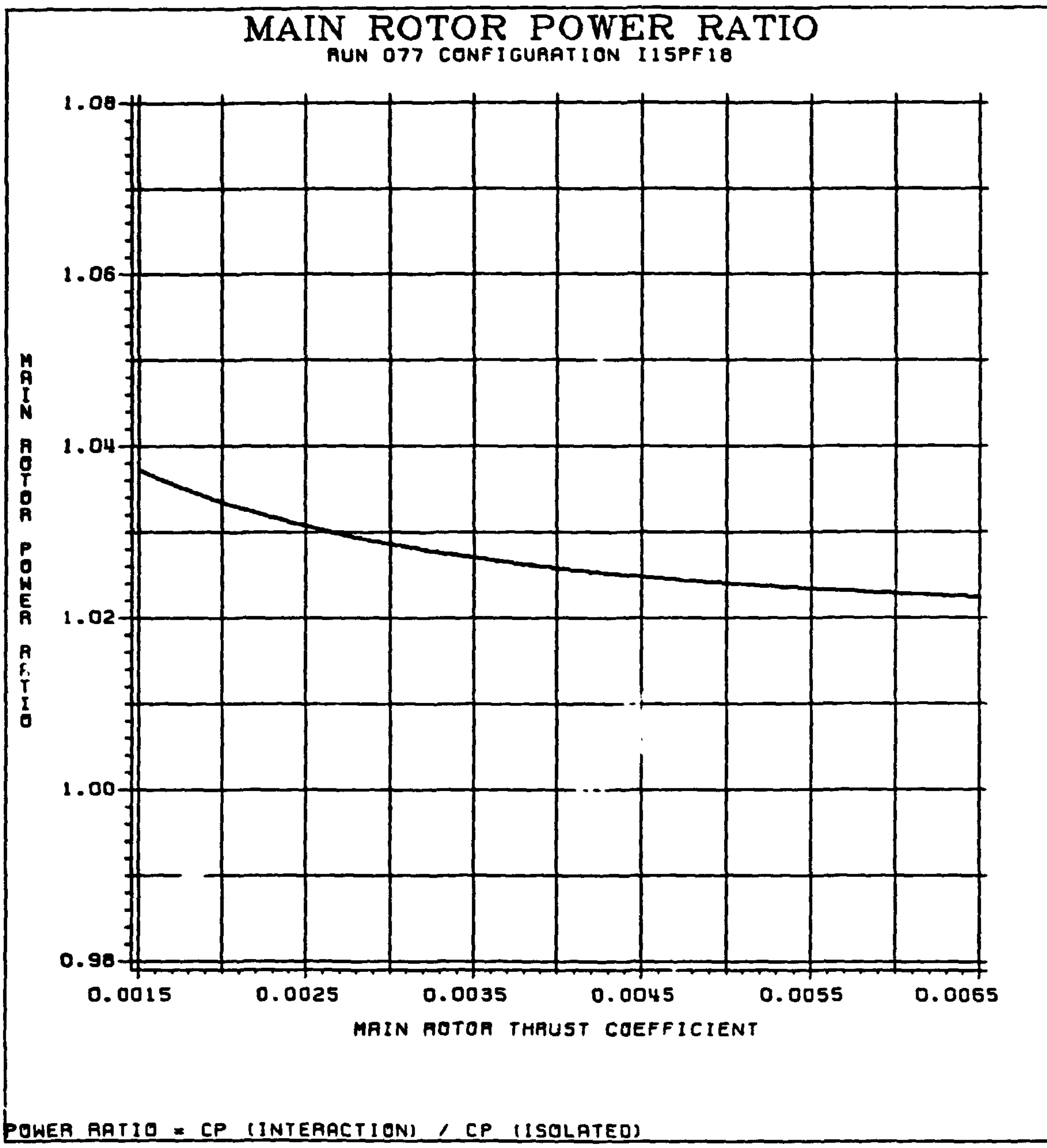
MAIN ROTOR POWER RATIO
RUN 075 CONFIGURATION I2PCF18
MAIN ROTOR POWER RATIO
1.08
1.06
1.04
1.02
1.00
0.98
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)


MAIN ROTOR POWER REQUIRED
RUN 076 CONFIGURATION I14PF18
POWER COEFFICIENT
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
THRUST COEFFICIENT
LEGEND: MODE
INTERACTION
ISOLATED

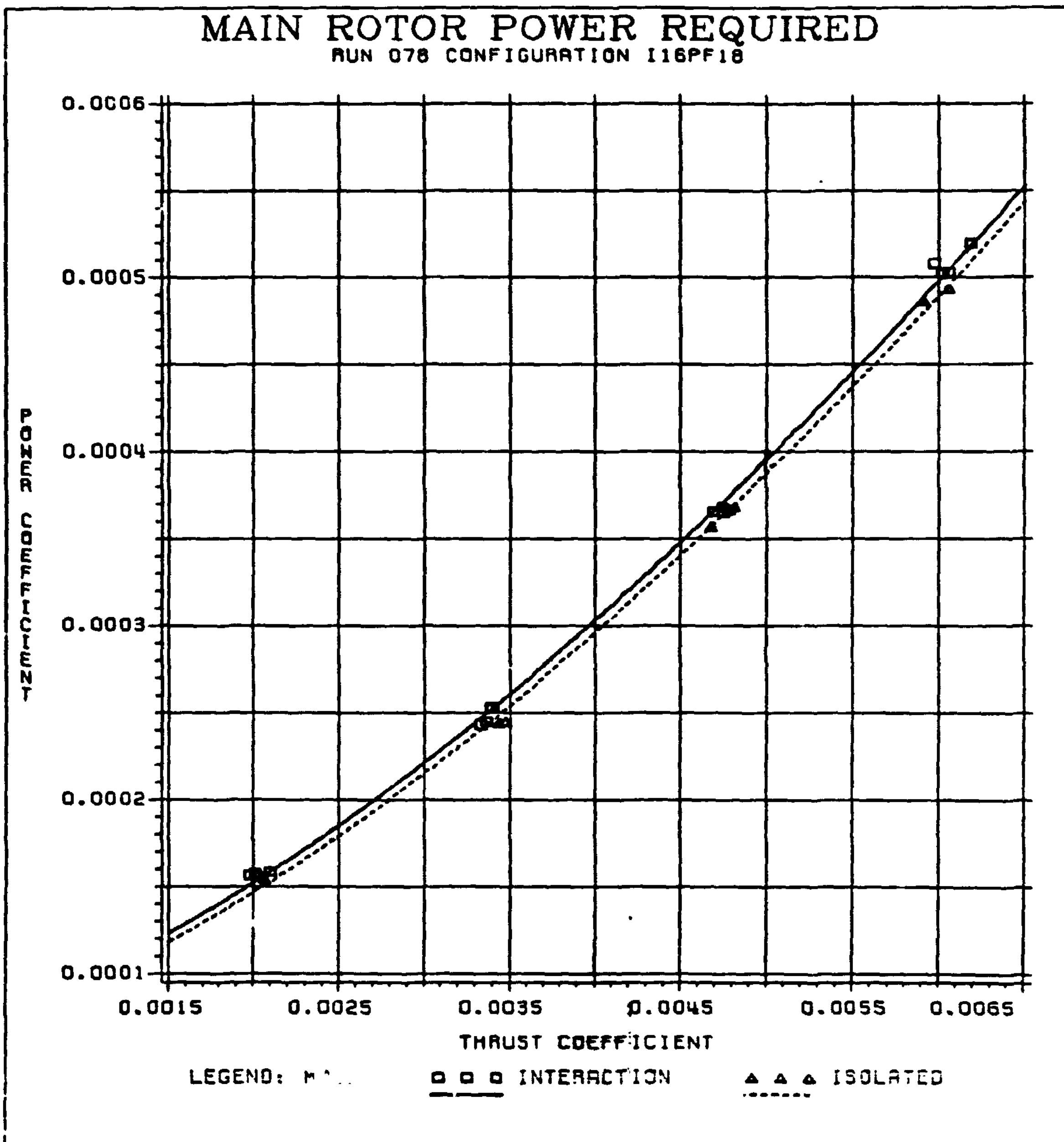

MAIN ROTOR POWER RATIO
RUN 076 CONFIGURATION I14PF18
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

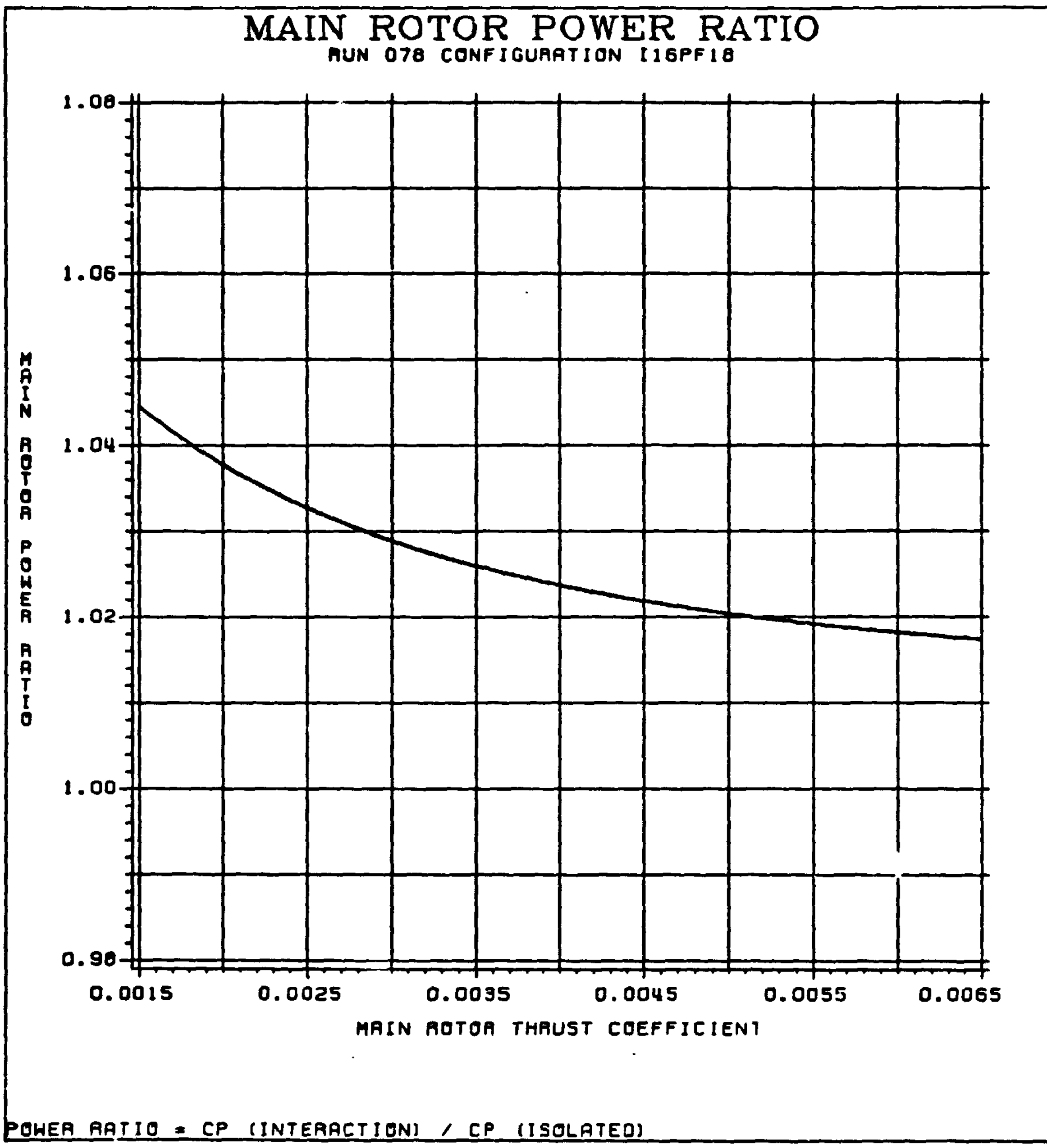
ORIGINAL PAGE IS
OF POOR QUALITY

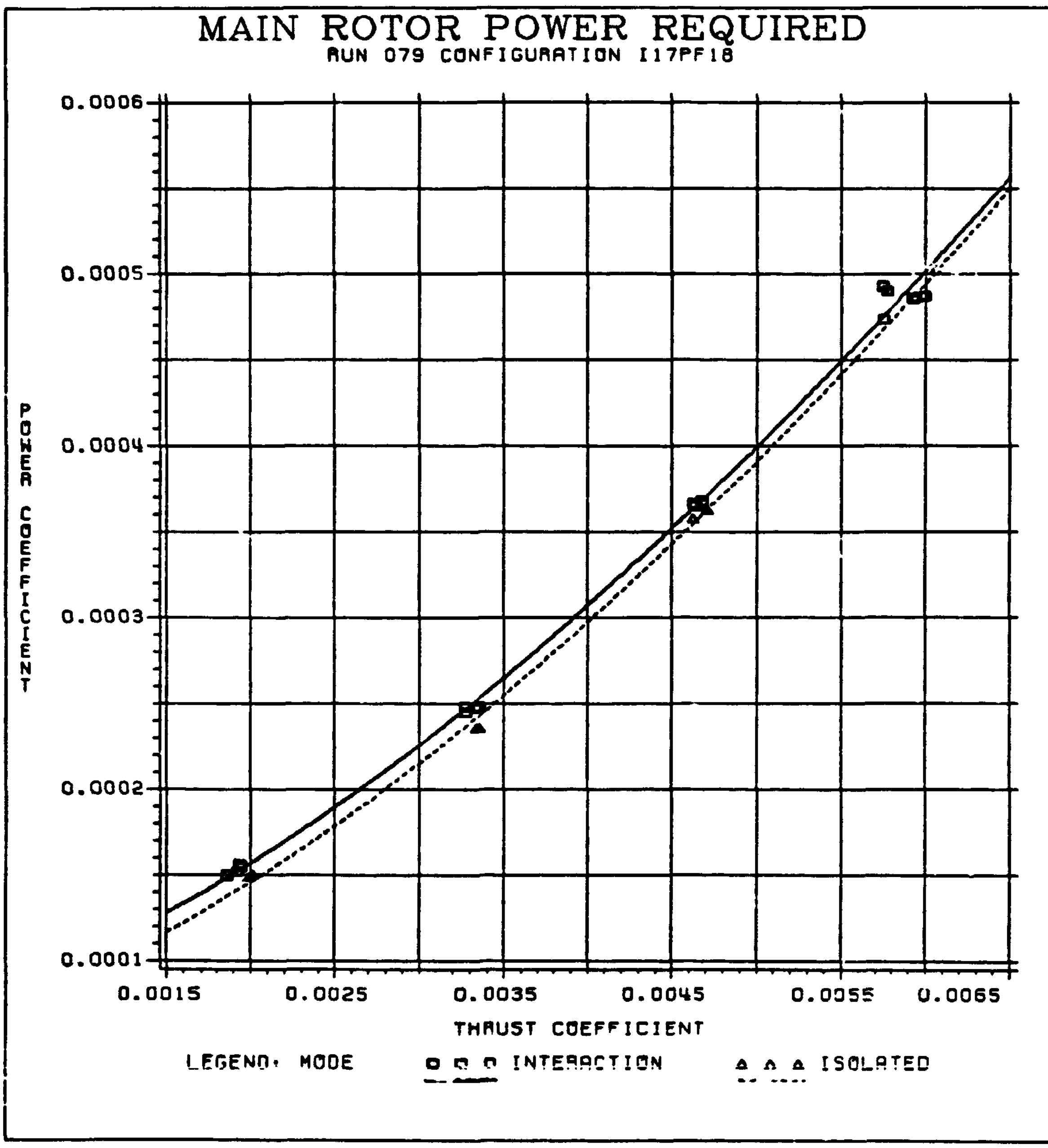


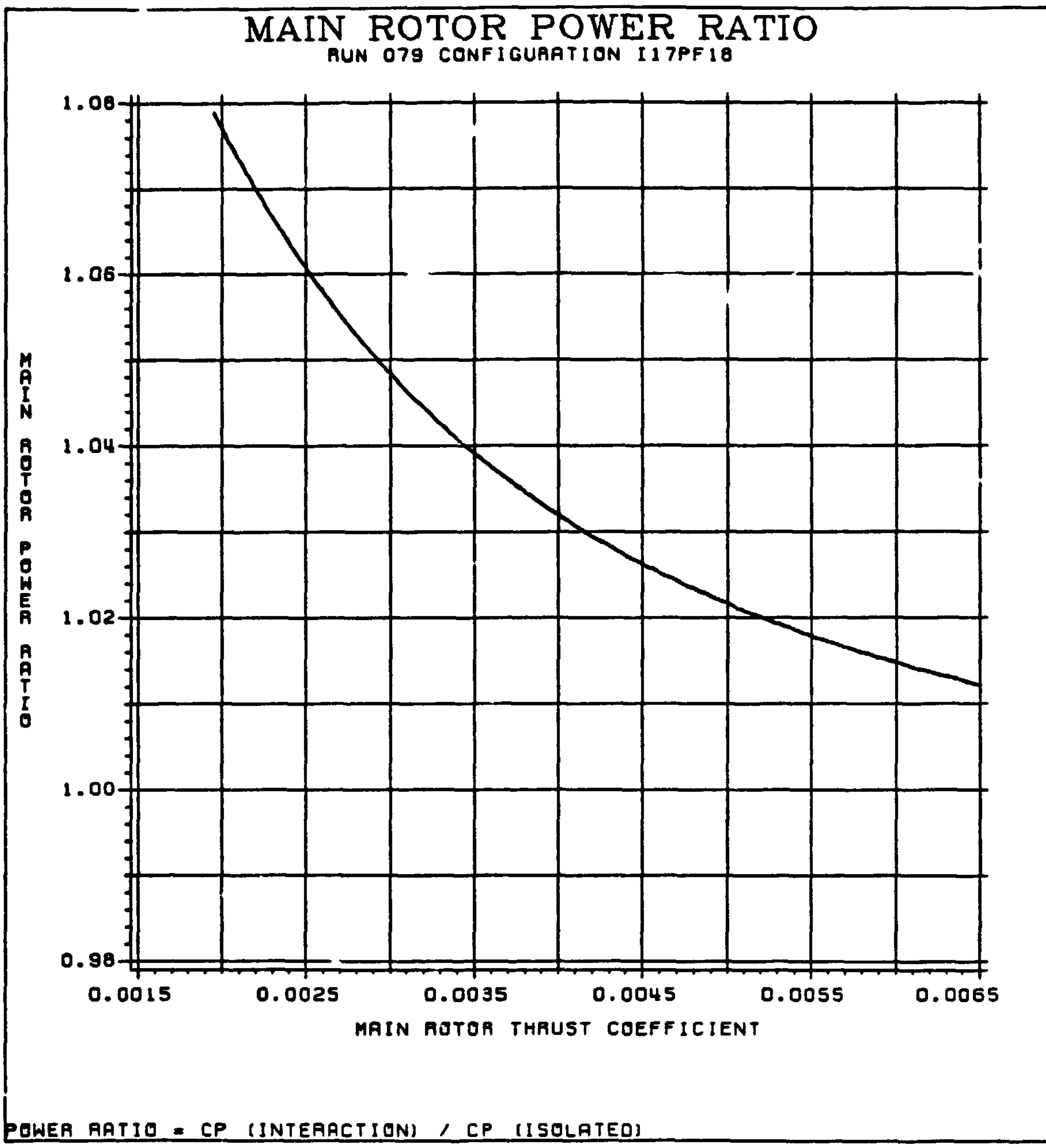

MAIN ROTOR POWER RATIO
RUN 077 CONFIGURATION I15PF18
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

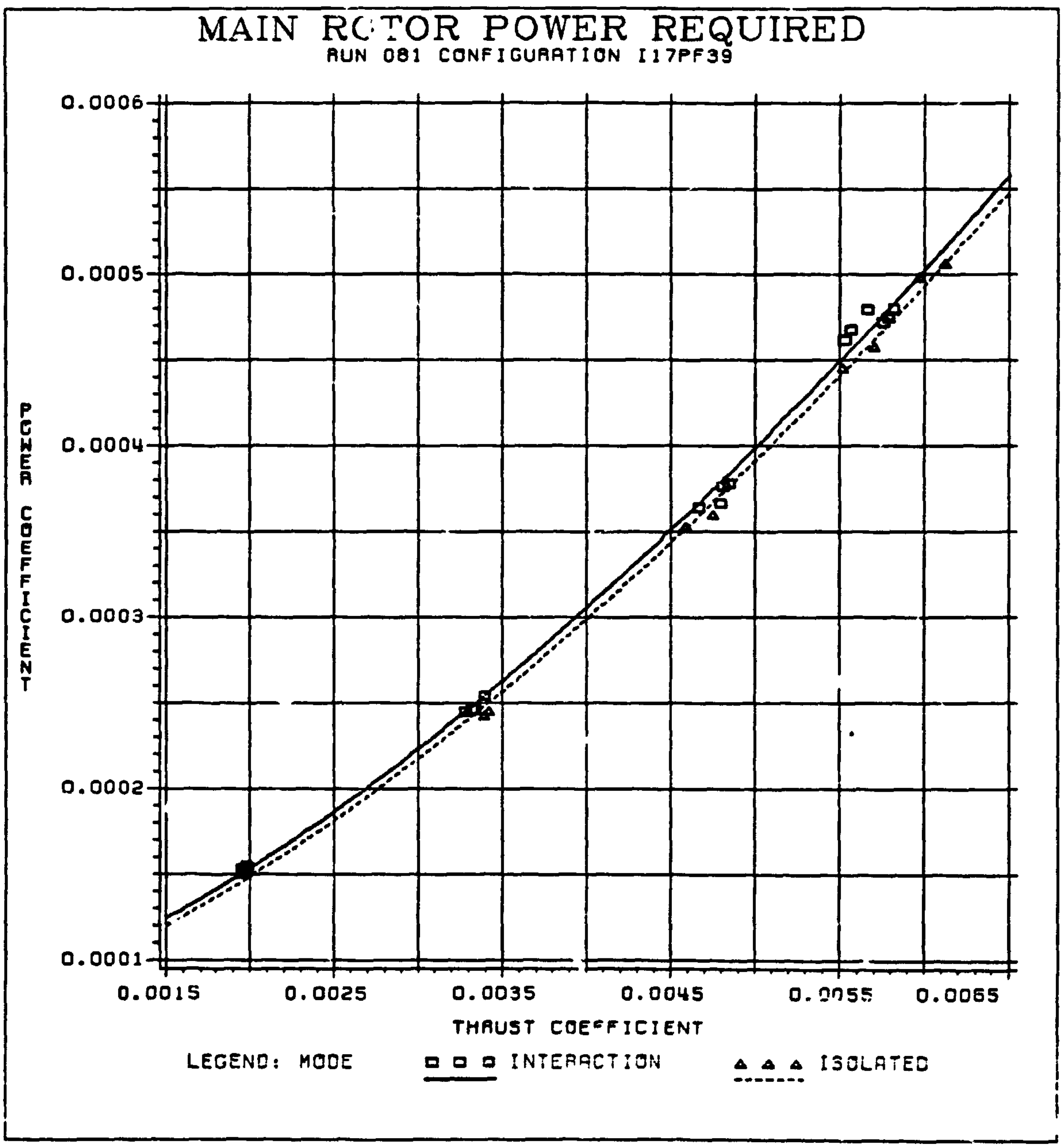
ORIGINAL PAGE IS
OF POOR QUALITY

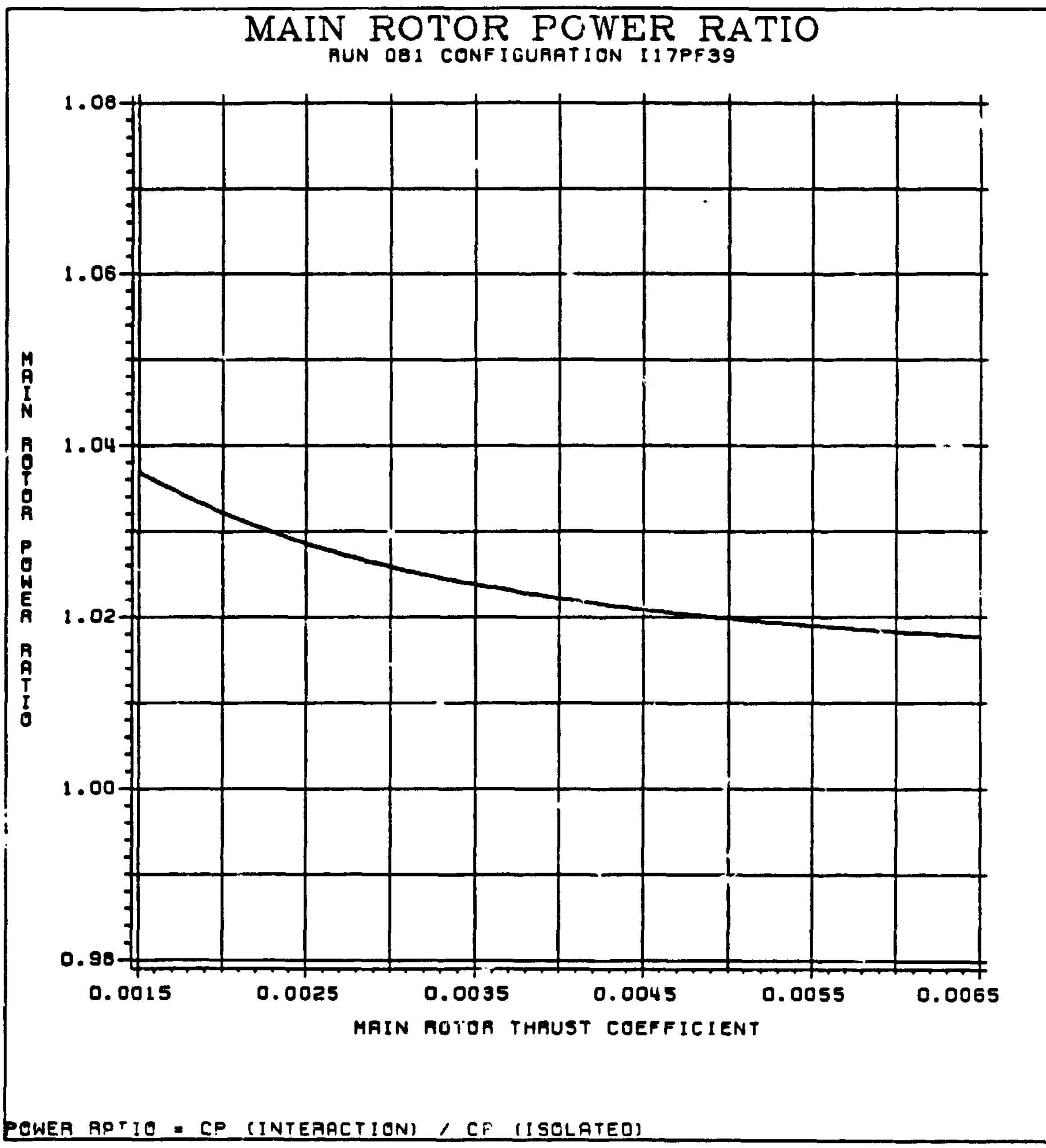


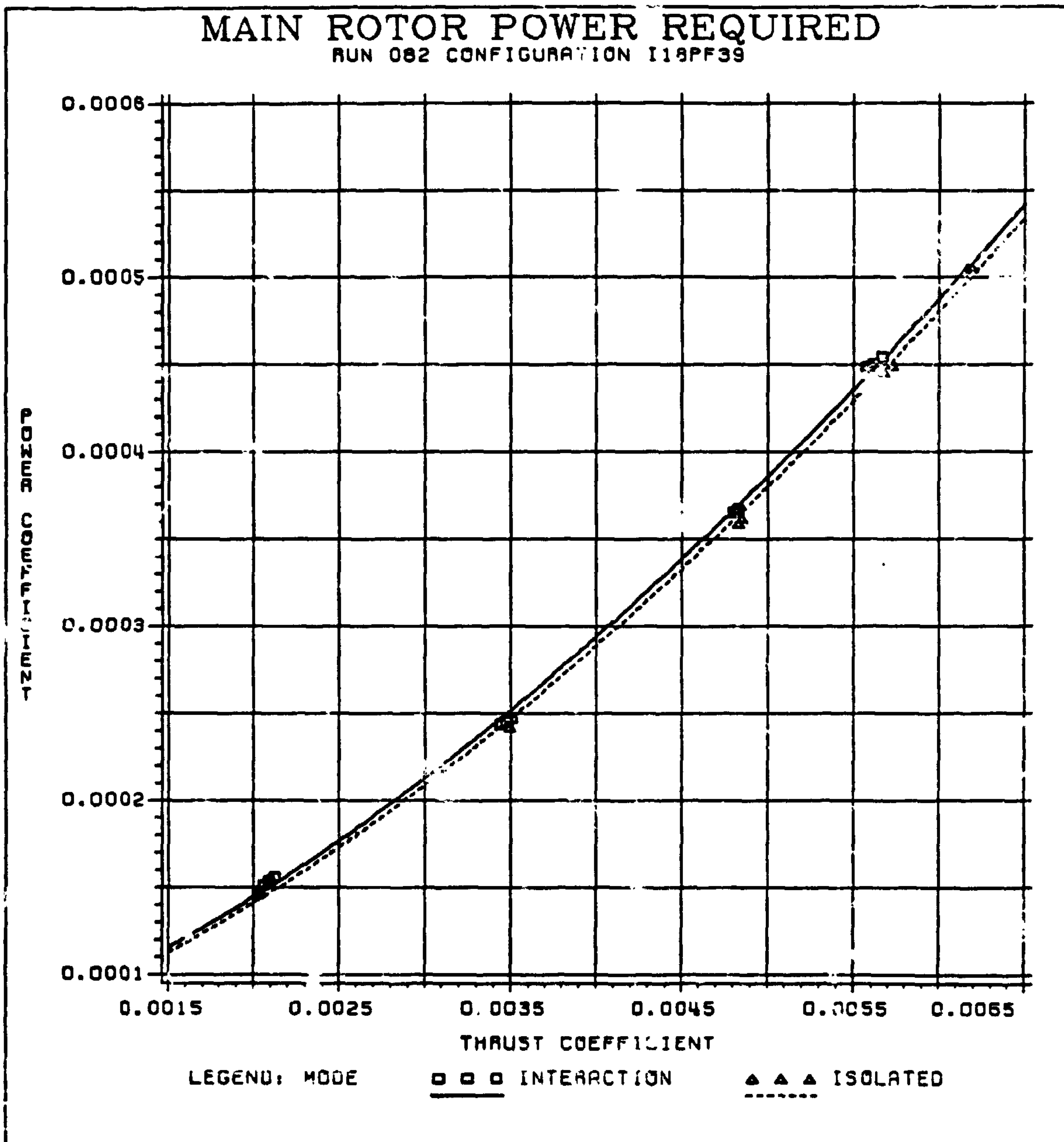

MAIN ROTOR POWER RATIO
RUN 078 CONFIGURATION I16PF18
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

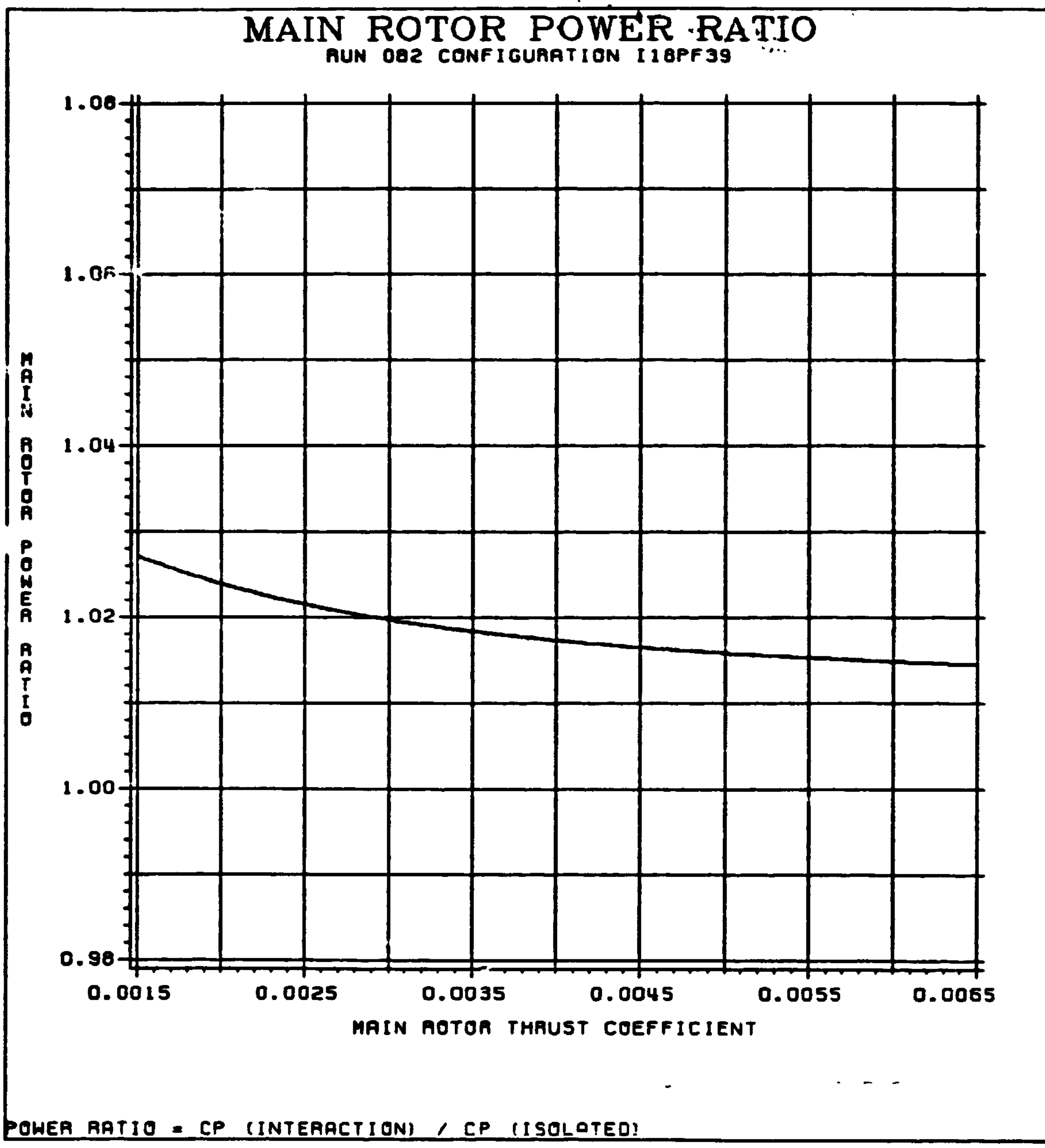

MAIN ROTOR POWER REQUIRED
RUN 079 CONFIGURATION I17PF18
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
POWER COEFFICIENT
THRUST COEFFICIENT
LEGEND: MODE
INTERACTION
ISOLATED


MAIN ROTOR POWER RATIO
RUN 079 CONFIGURATION I17PF18
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

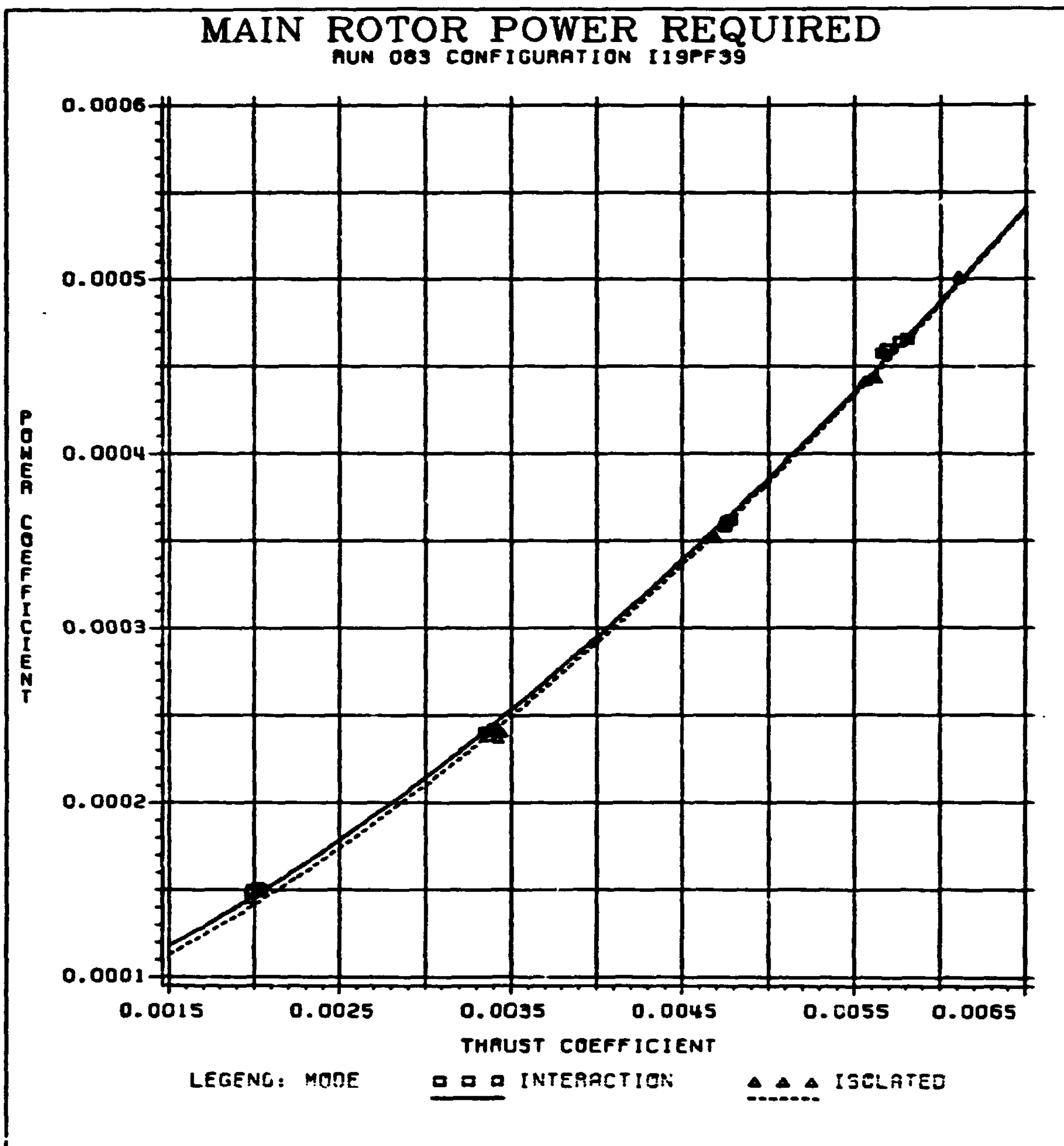

MAIN ROTOR POWER REQUIRED
RUN 081 CONFIGURATION I17PF39
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
POWER COEFFICIENT
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
THRUST COEFFICIENT
LEGEND: MODE
INTERACTION
ISOLATED


MAIN ROTOR POWER RATIO
RUN 081 CONFIGURATION I17PF39
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

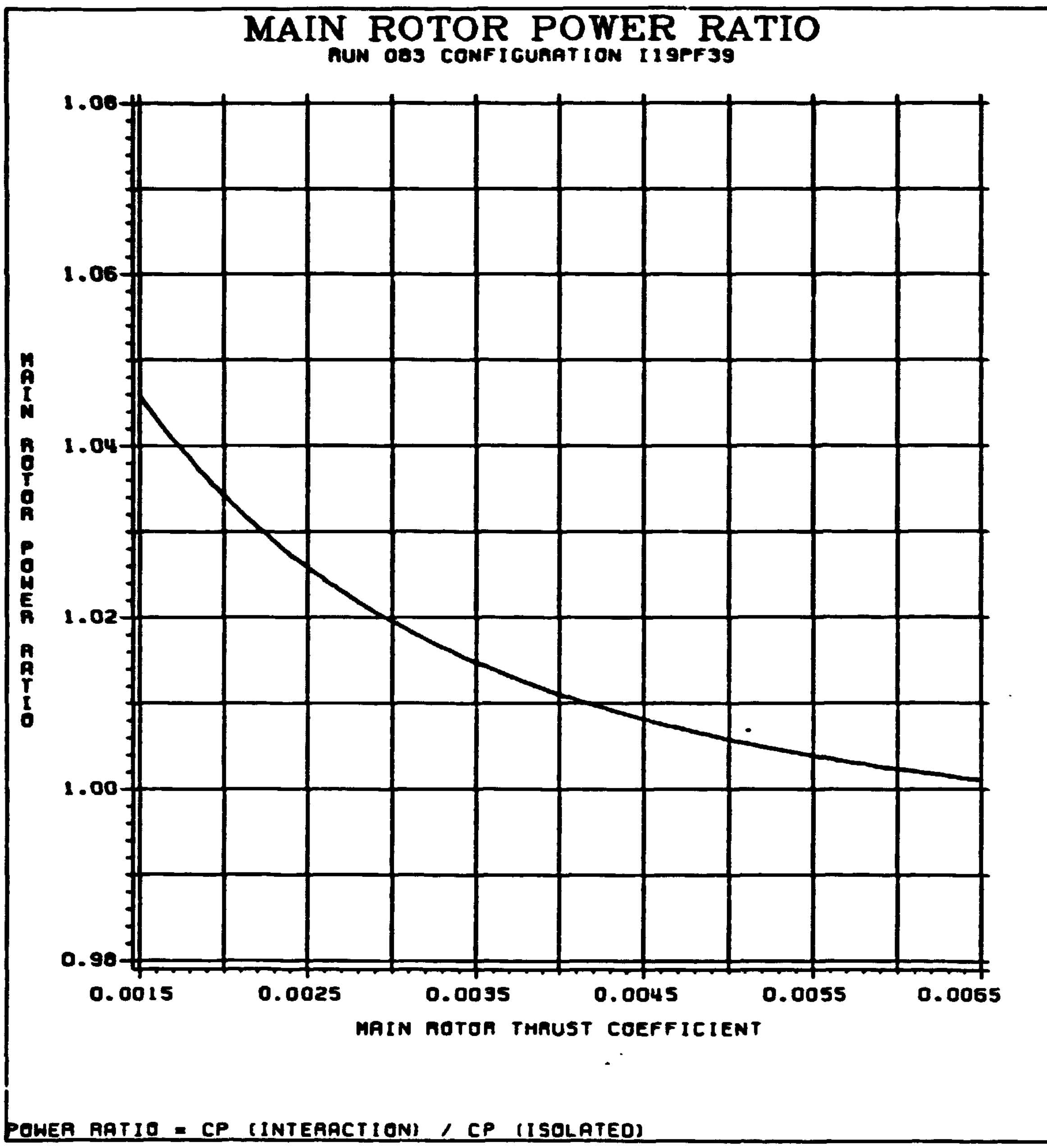

MAIN ROTOR POWER REQUIRED
RUN 082 CONFIGURATION I18PF39
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
POWER COEFFICIENT
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
THRUST COEFFICIENT
LEGEND: MODE
INTERACTION
ISOLATED


MAIN ROTOR POWER RATIO
RUN 082 CONFIGURATION I18PF39
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

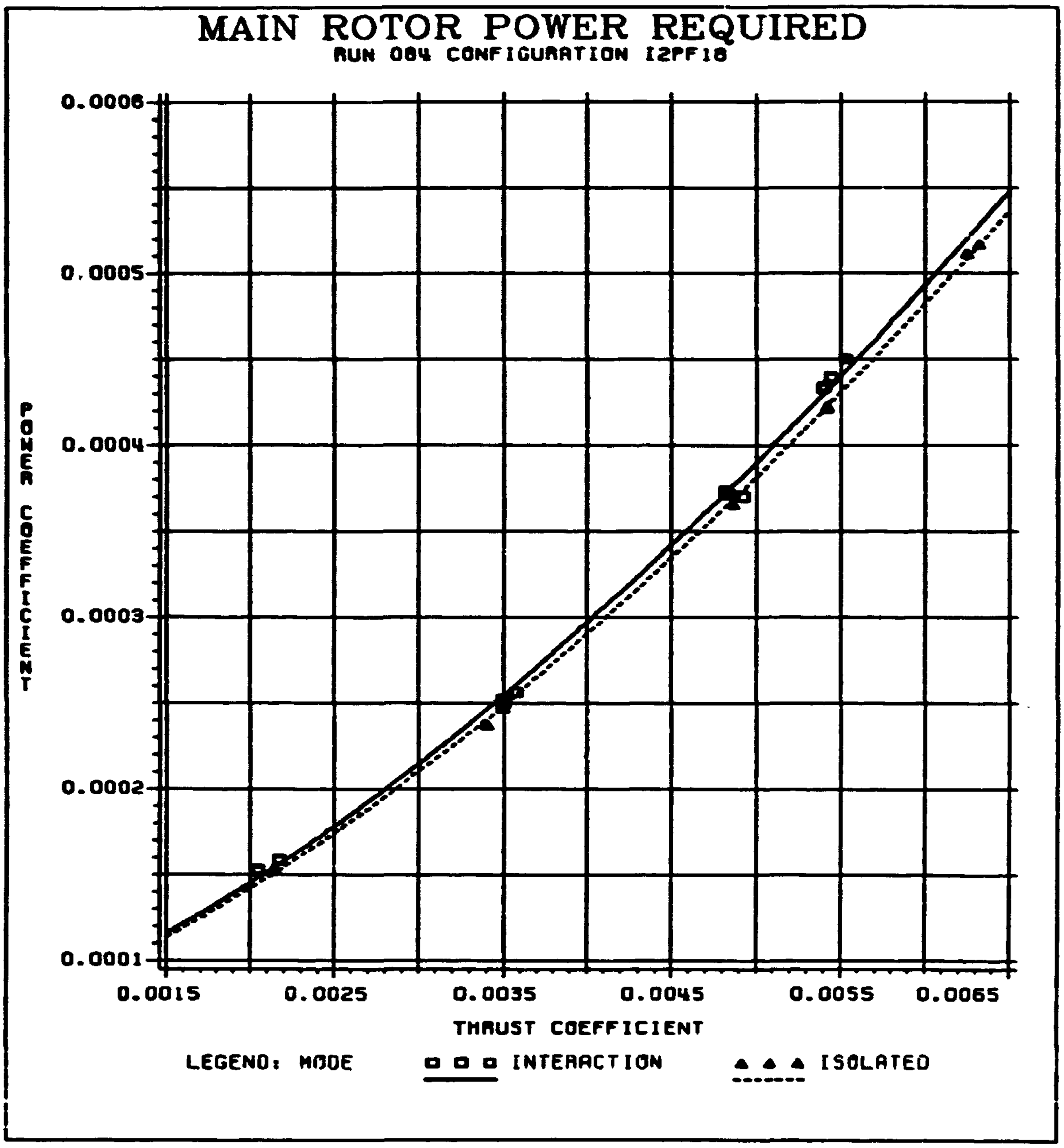
ORIGINAL PAGE IS OF POOR QUALITY

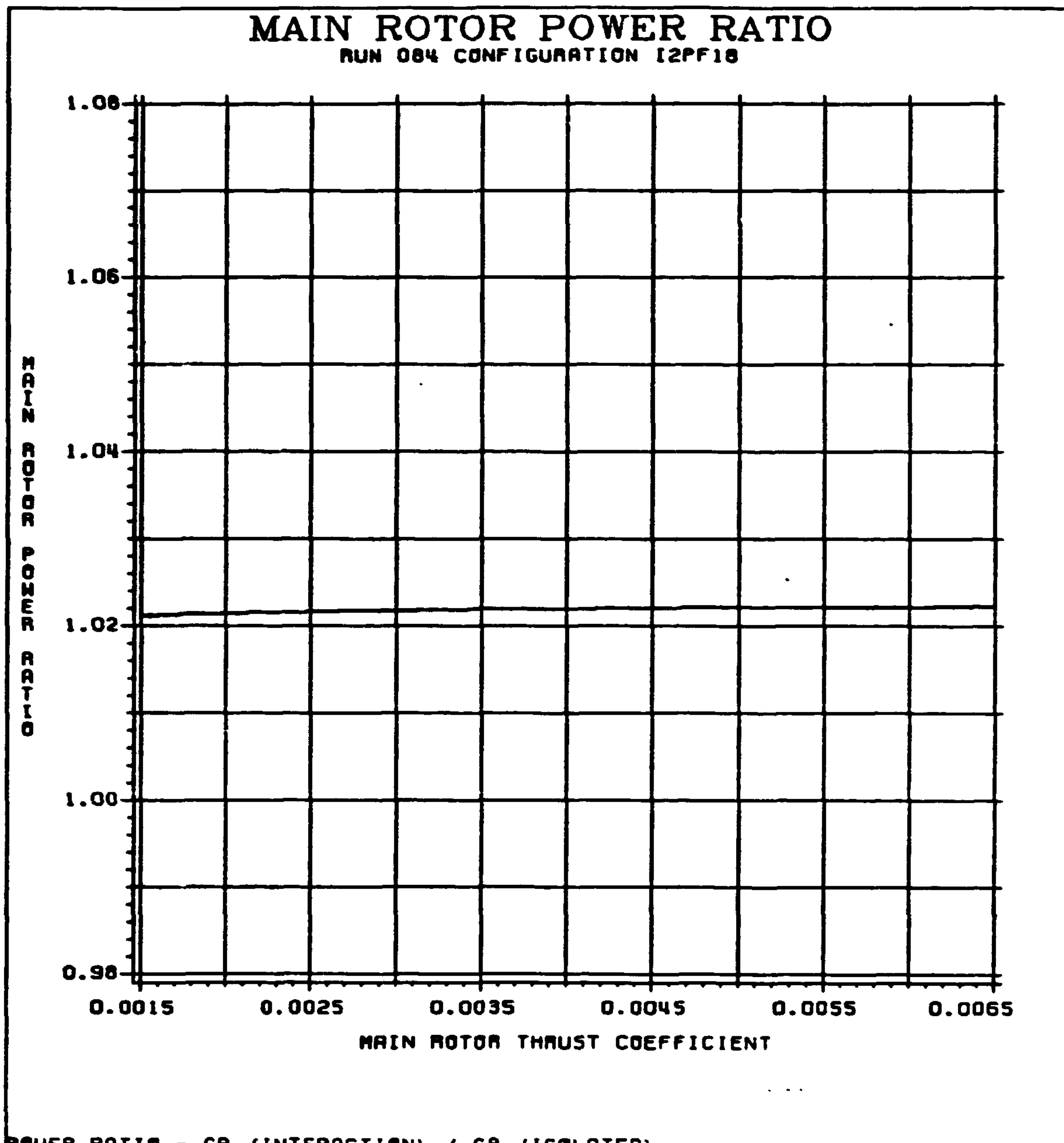


ORIGINAL PAGE IS OF POOR QUALITY

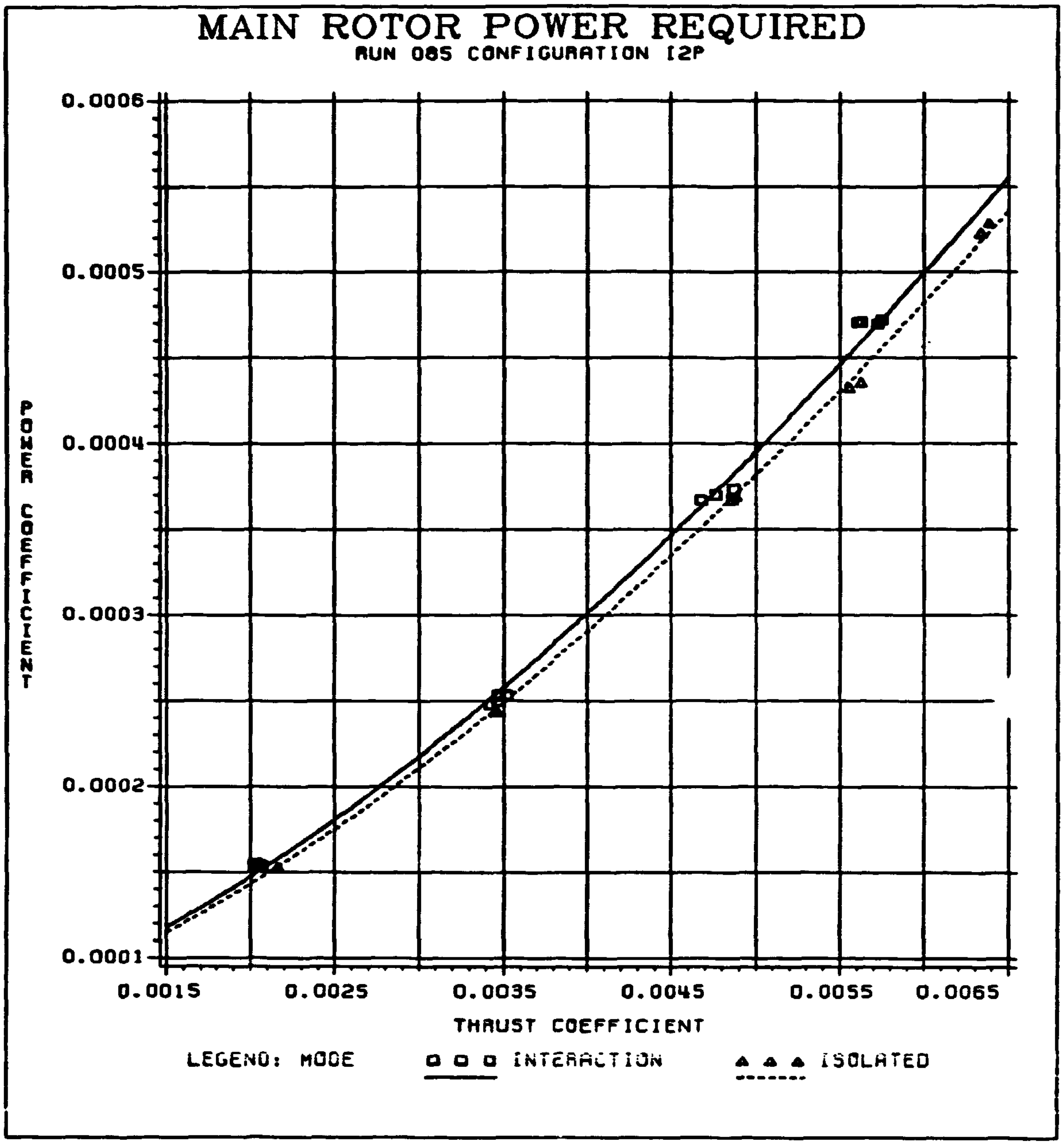

MAIN ROTOR POWER RATIO
RUN 083 CONFIGURATION I19PF39
MAIN ROTOR POWER RATIO
1.08
1.06
1.04
1.02
1.00
0.98
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

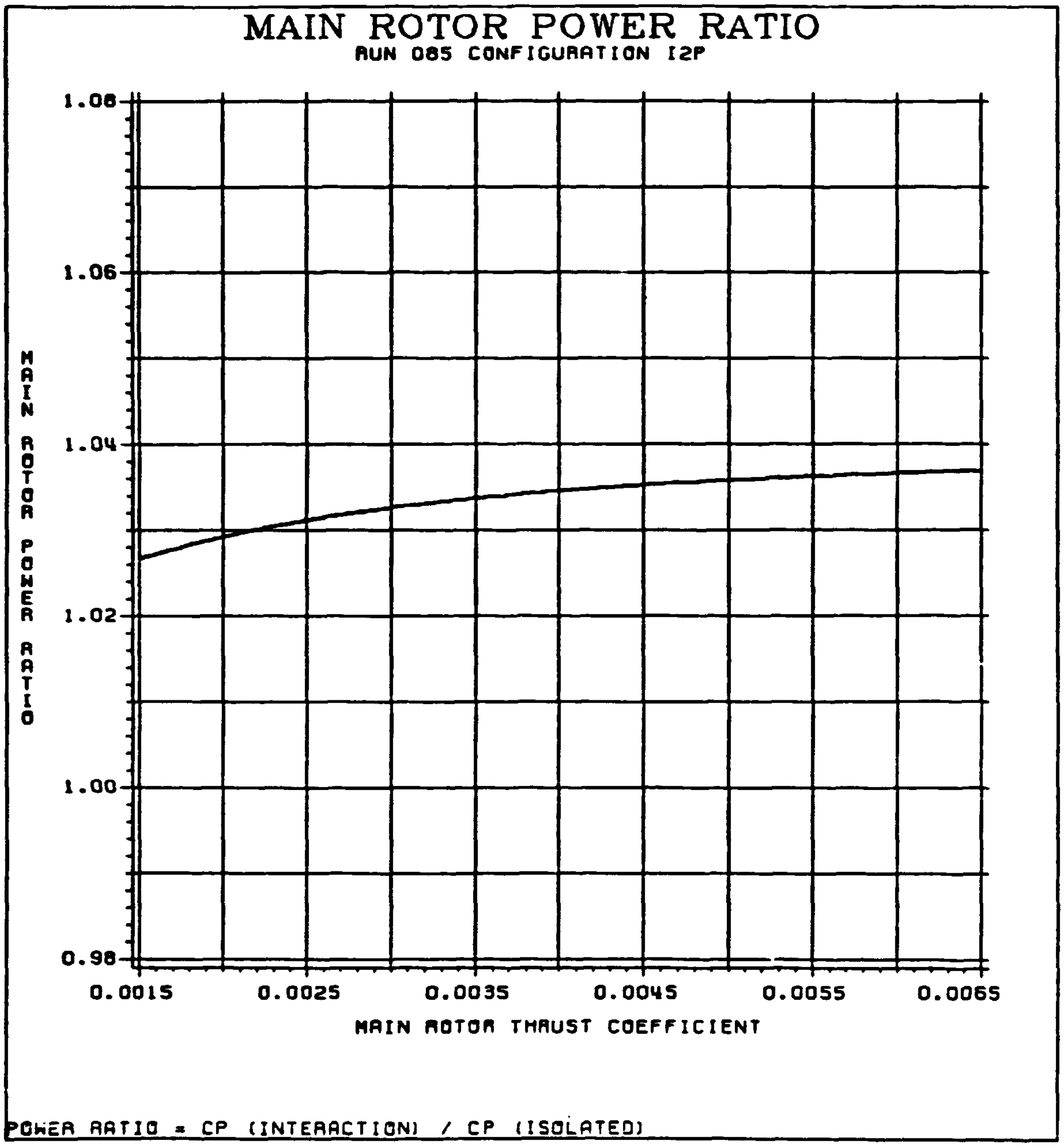
ORIGINAL PAGE IS OF POOR QUALITY

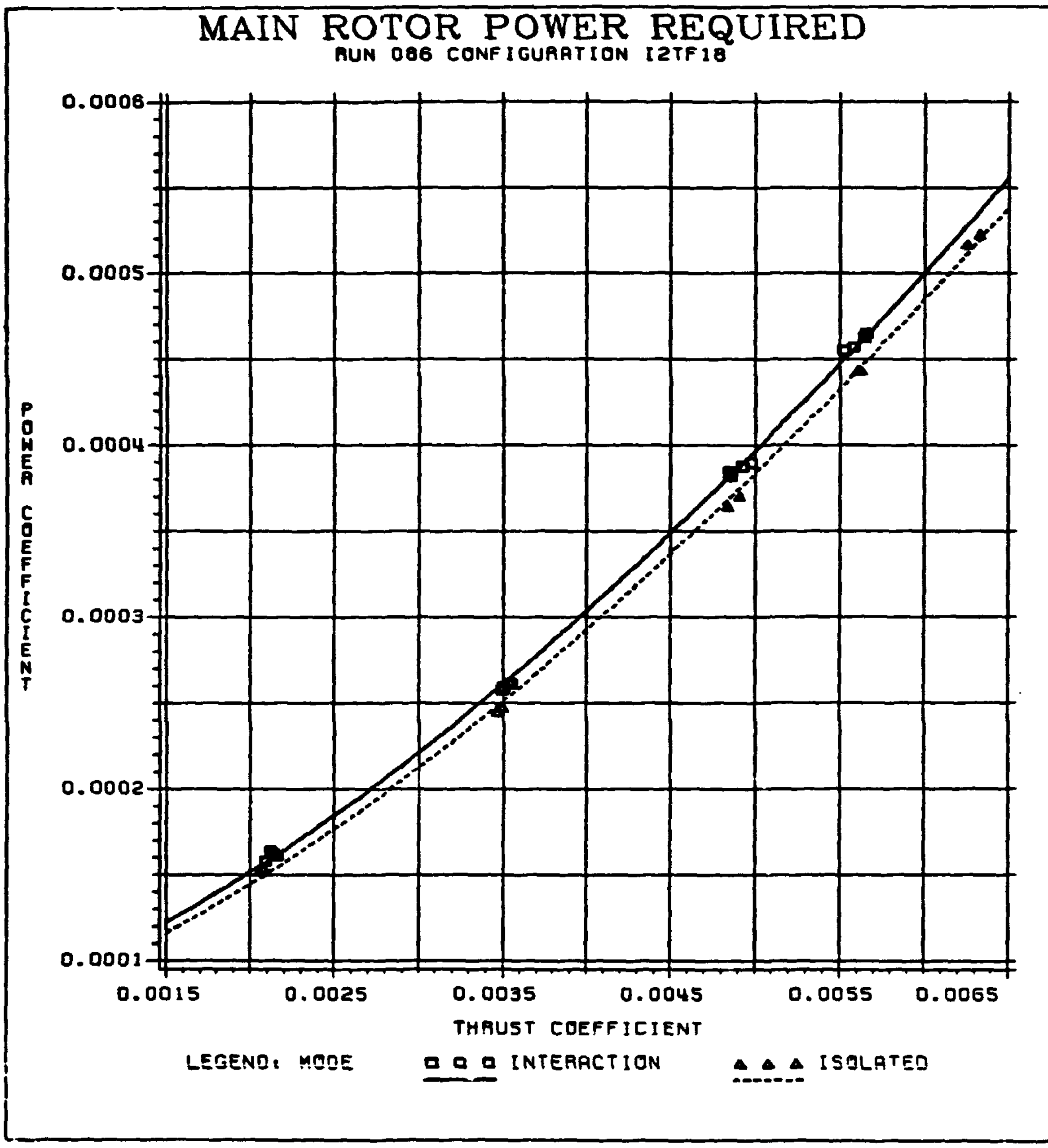


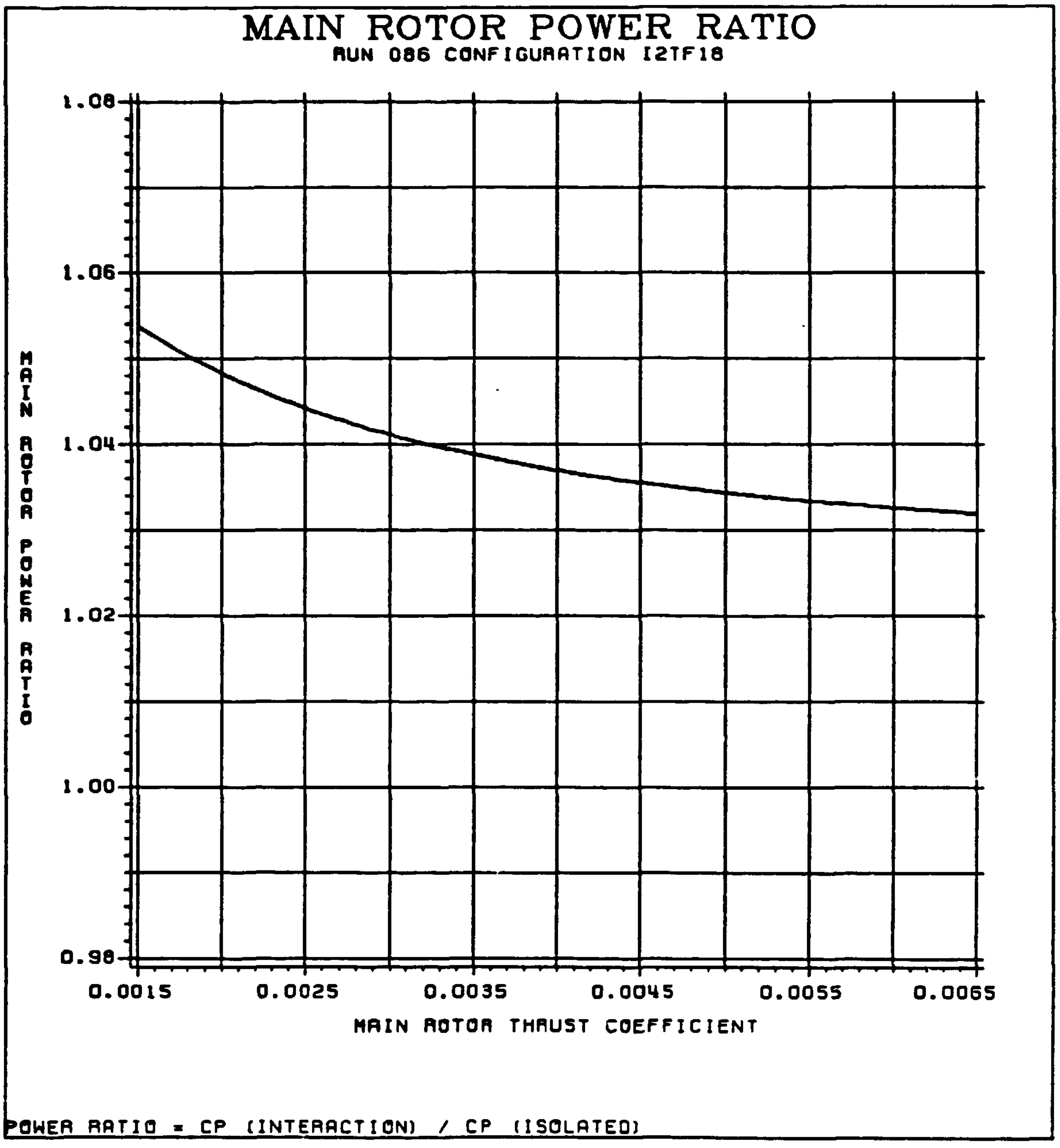

MAIN ROTOR POWER RATIO
RUN 084 CONFIGURATION I2PF18
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

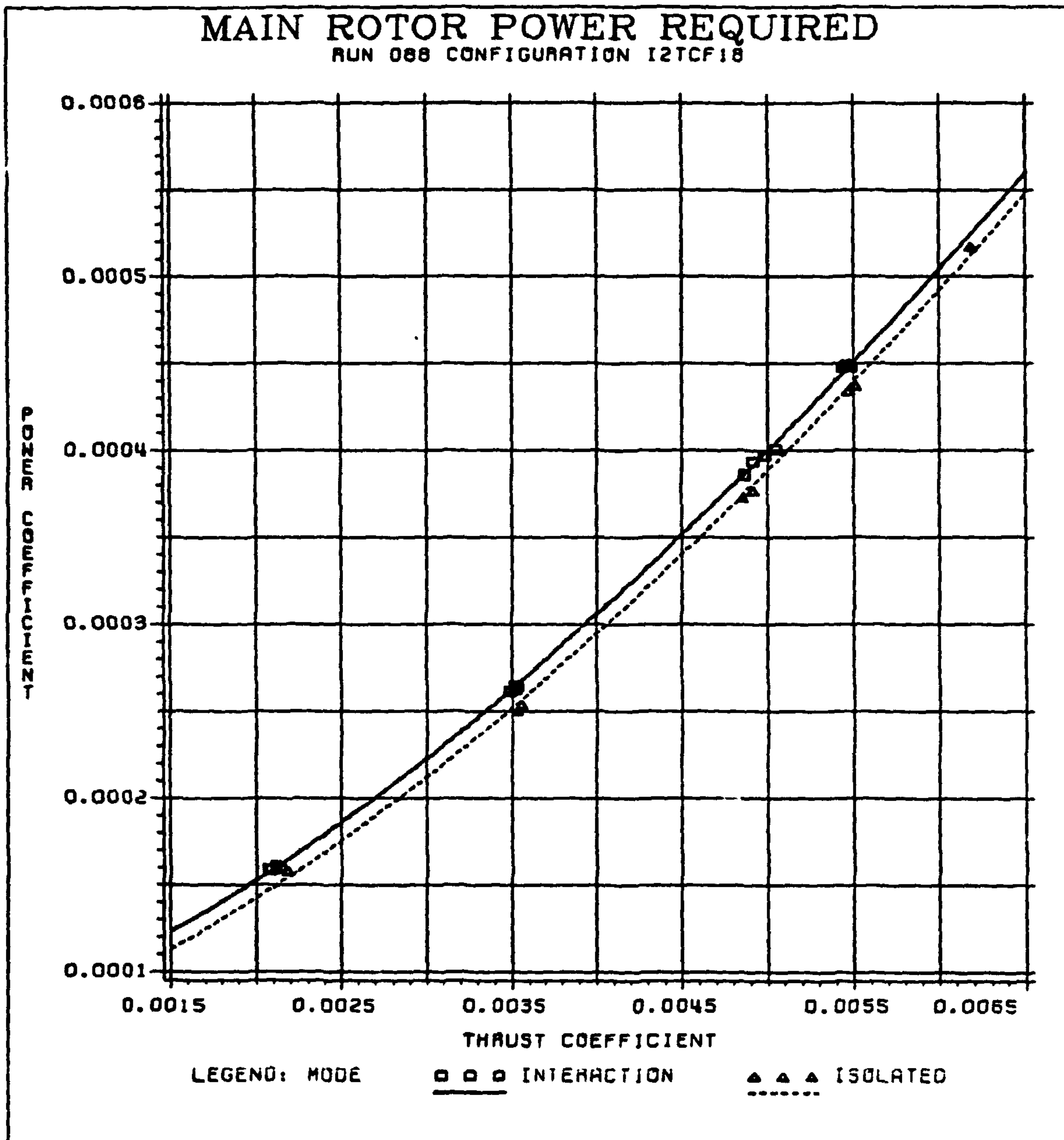
ORIGINAL PAGE IS
OF POOR QUALITY

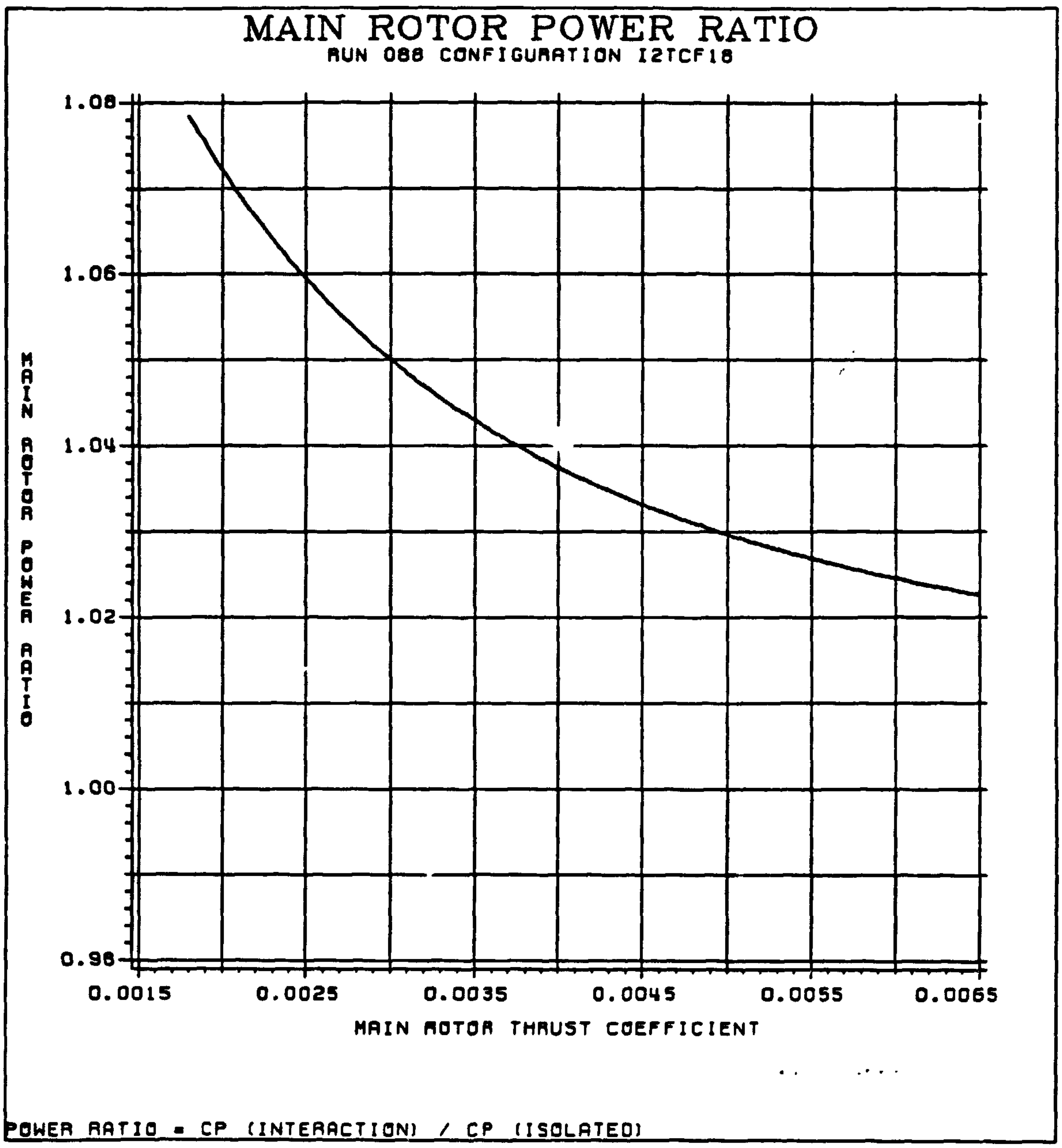


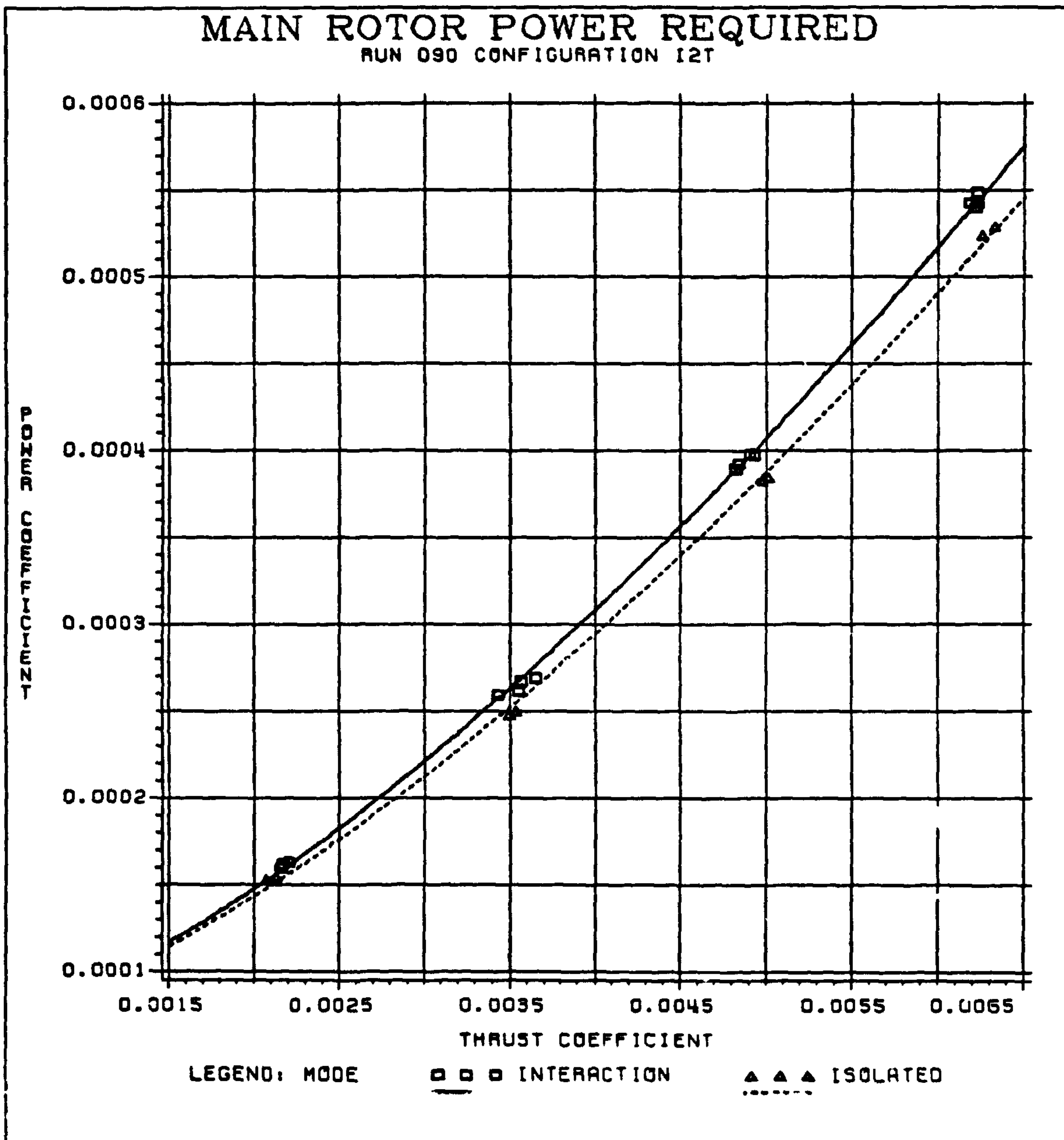

MAIN ROTOR POWER RATIO
RUN 085 CONFIGURATION I2P
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

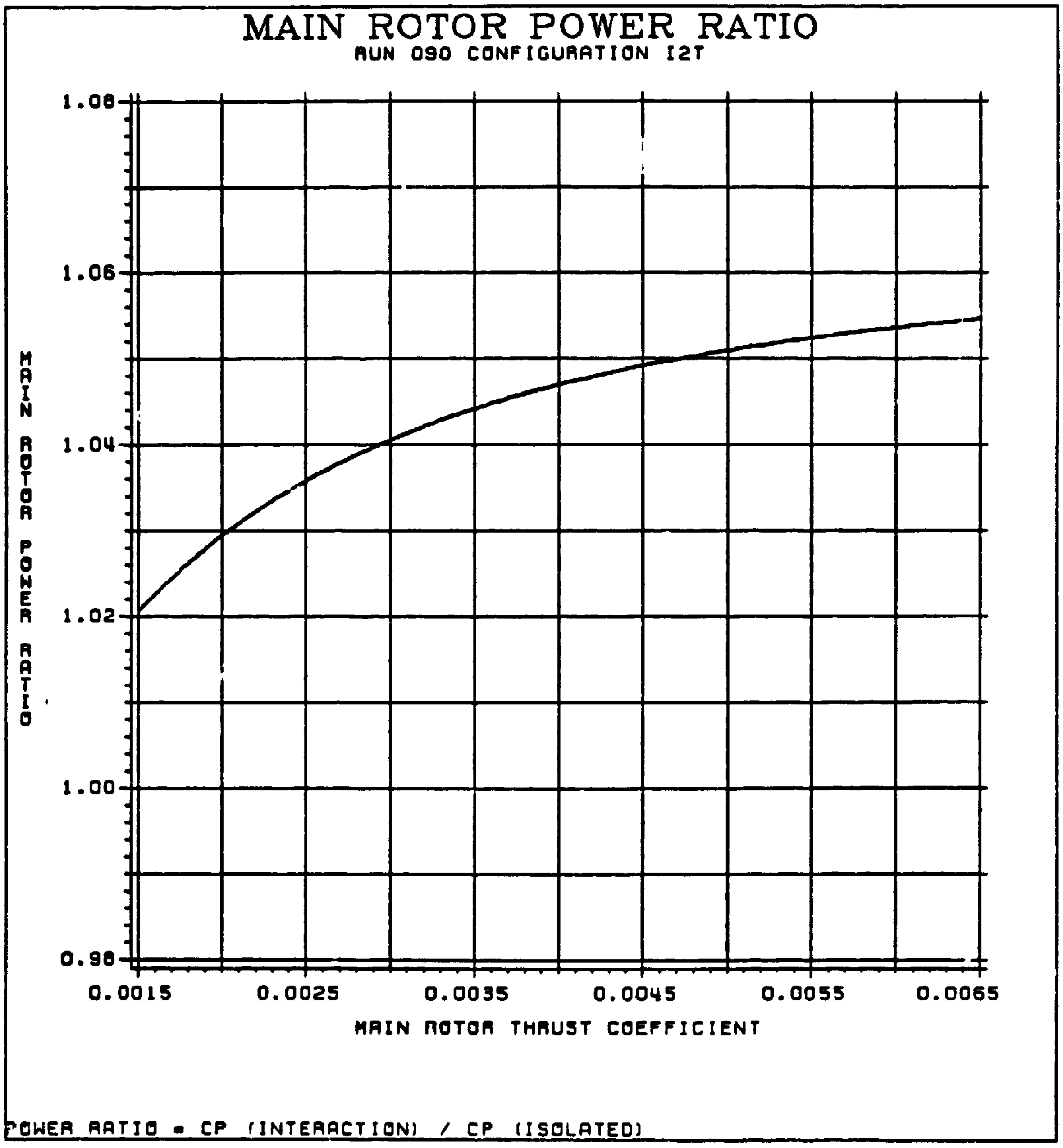

MAIN ROTOR POWER REQUIRED
RUN 086 CONFIGURATION I2TF18
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
POWER COEFFICIENT
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
THRUST COEFFICIENT
LEGEND: MODE
INTERACTION
ISOLATED

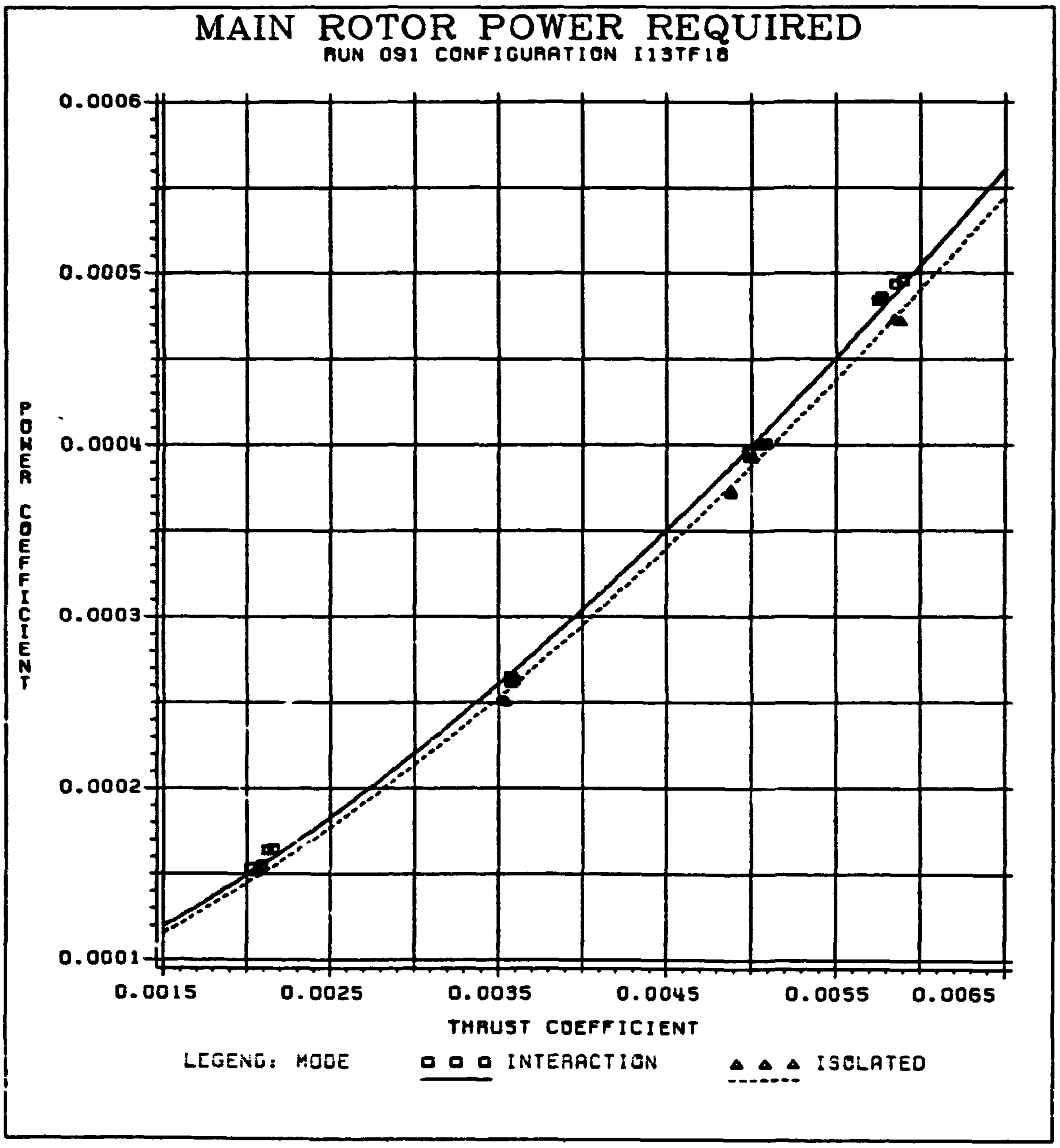

MAIN ROTOR POWER RATIO
RUN 086 CONFIGURATION I2TF18
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

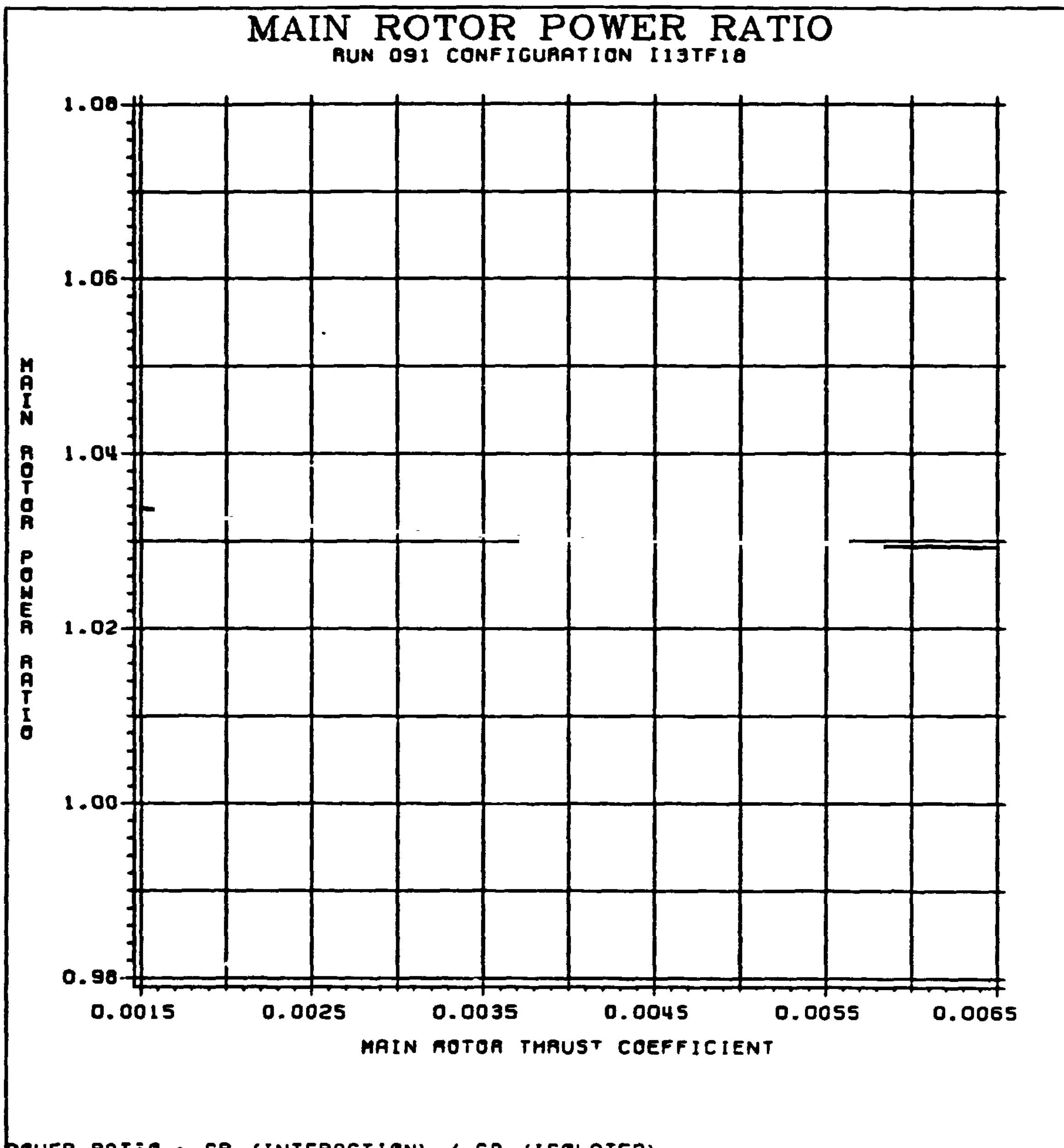

MAIN ROTOR POWER REQUIRED
RUN 088 CONFIGURATION I2TCF18
POWER COEFFICIENT
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
THRUST COEFFICIENT
LEGEND: MODE
INTERACTION
ISOLATED

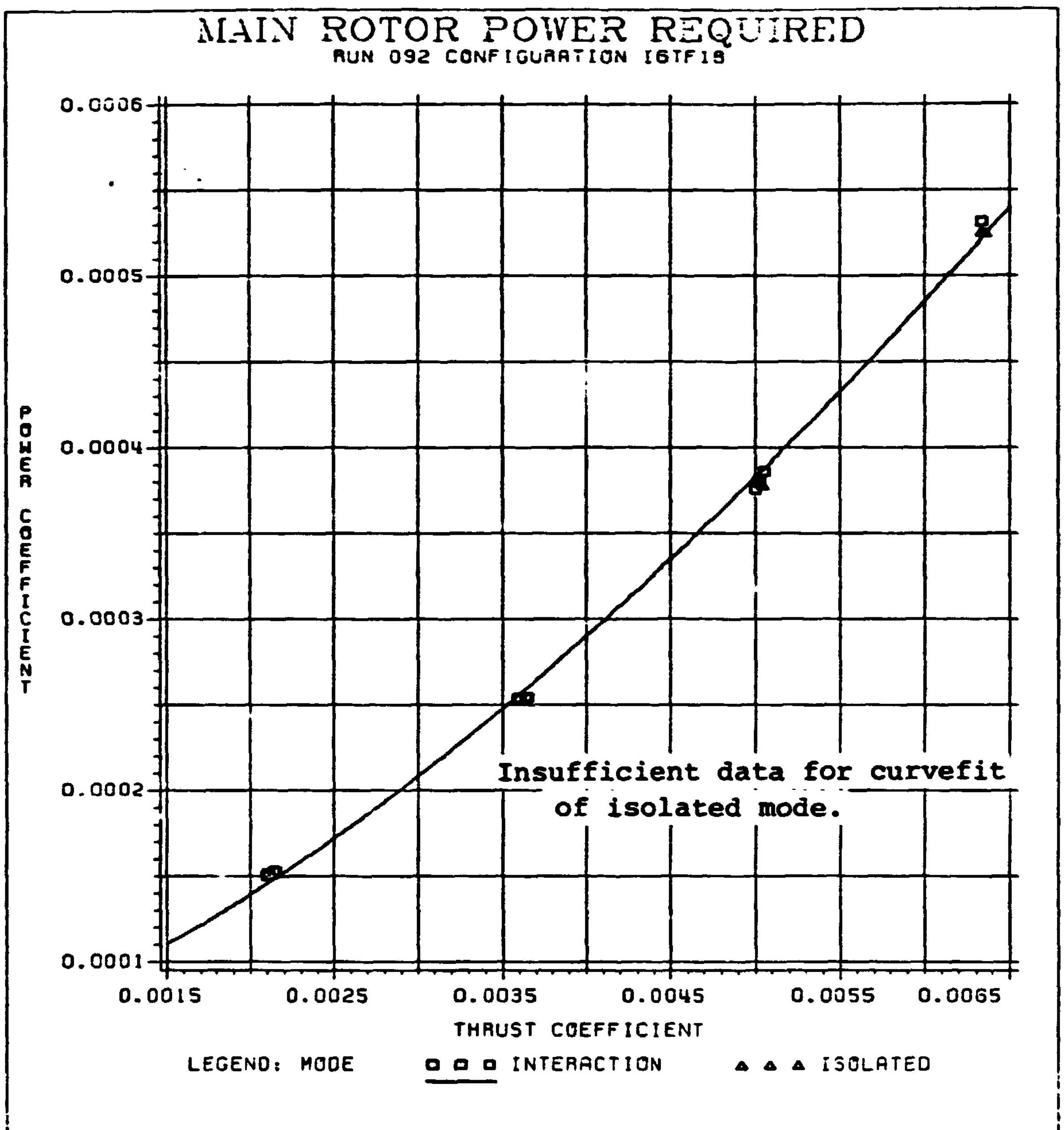

MAIN ROTOR POWER RATIO
RUN 088 CONFIGURATION I2TCF18
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)


MAIN ROTOR POWER REQUIRED
RUN 090 CONFIGURATION I2T
POWER COEFFICIENT
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
THRUST COEFFICIENT
LEGEND: MODE
INTERACTION
ISOLATED

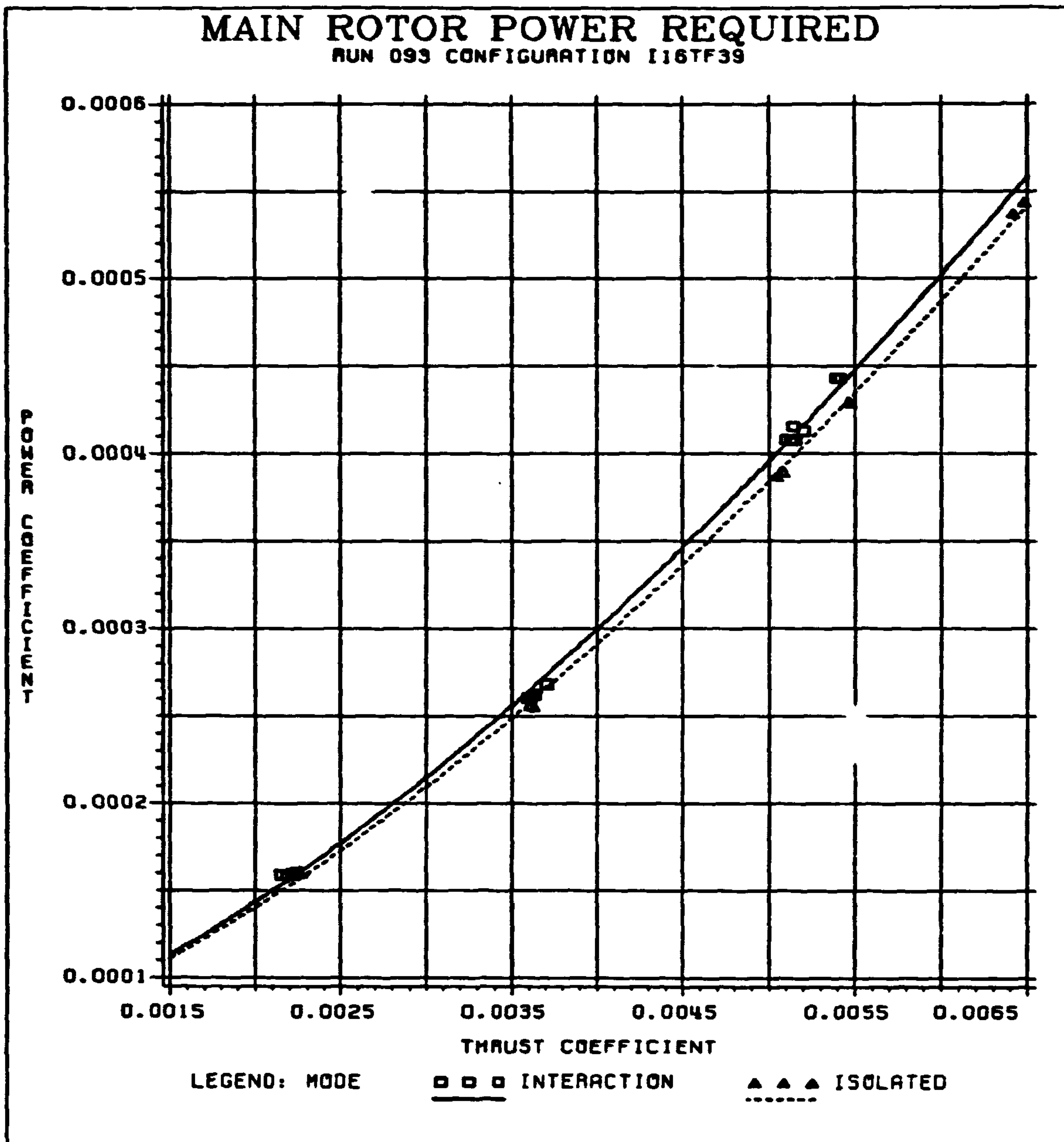

MAIN ROTOR POWER RATIO
RUN 090 CONFIGURATION I2T
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

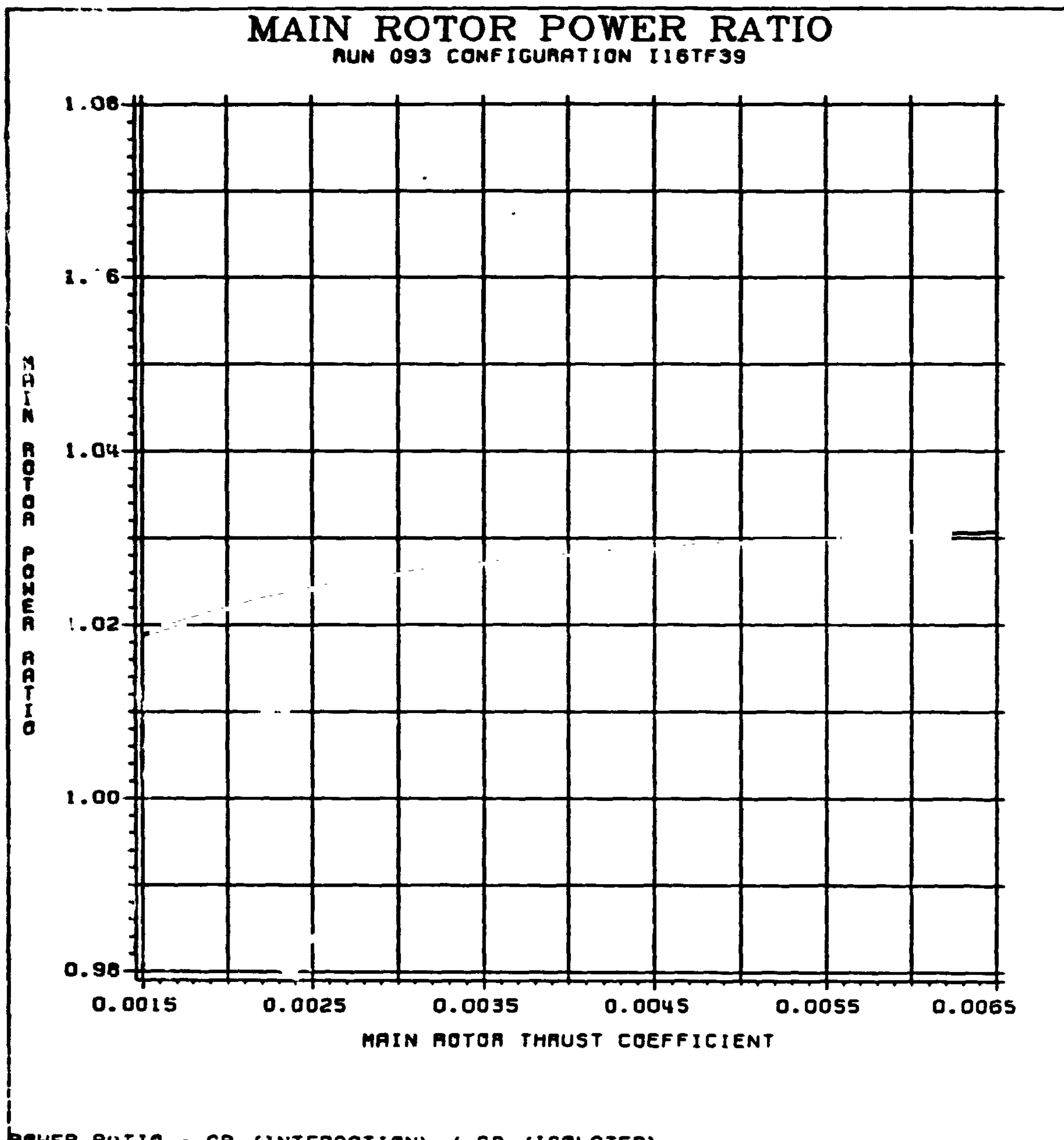

MAIN ROTOR POWER REQUIRED
RUN 091 CONFIGURATION I13TF18
POWER COEFFICIENT
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
THRUST COEFFICIENT
LEGEND: MODE
INTERACTION
ISOLATED


MAIN ROTOR POWER RATIO
RUN 091 CONFIGURATION I13TF18
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

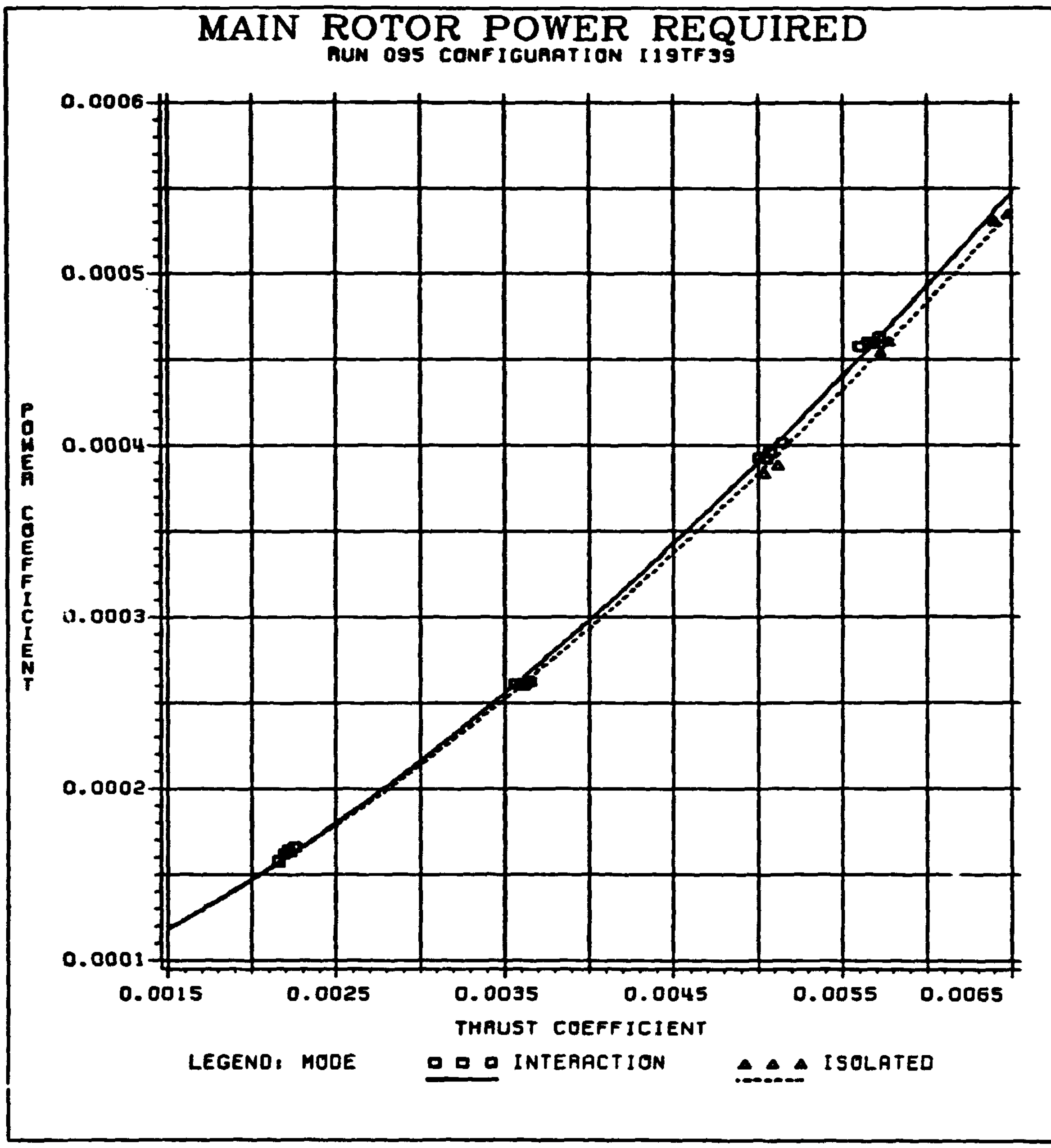

MAIN ROTOR POWER REQUIRED
RUN 092 CONFIGURATION I6TF18
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
POWER COEFFICIENT
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
THRUST COEFFICIENT
Insufficient data for curvefit of isolated mode.
LEGEND: MODE
INTERACTION
ISOLATED

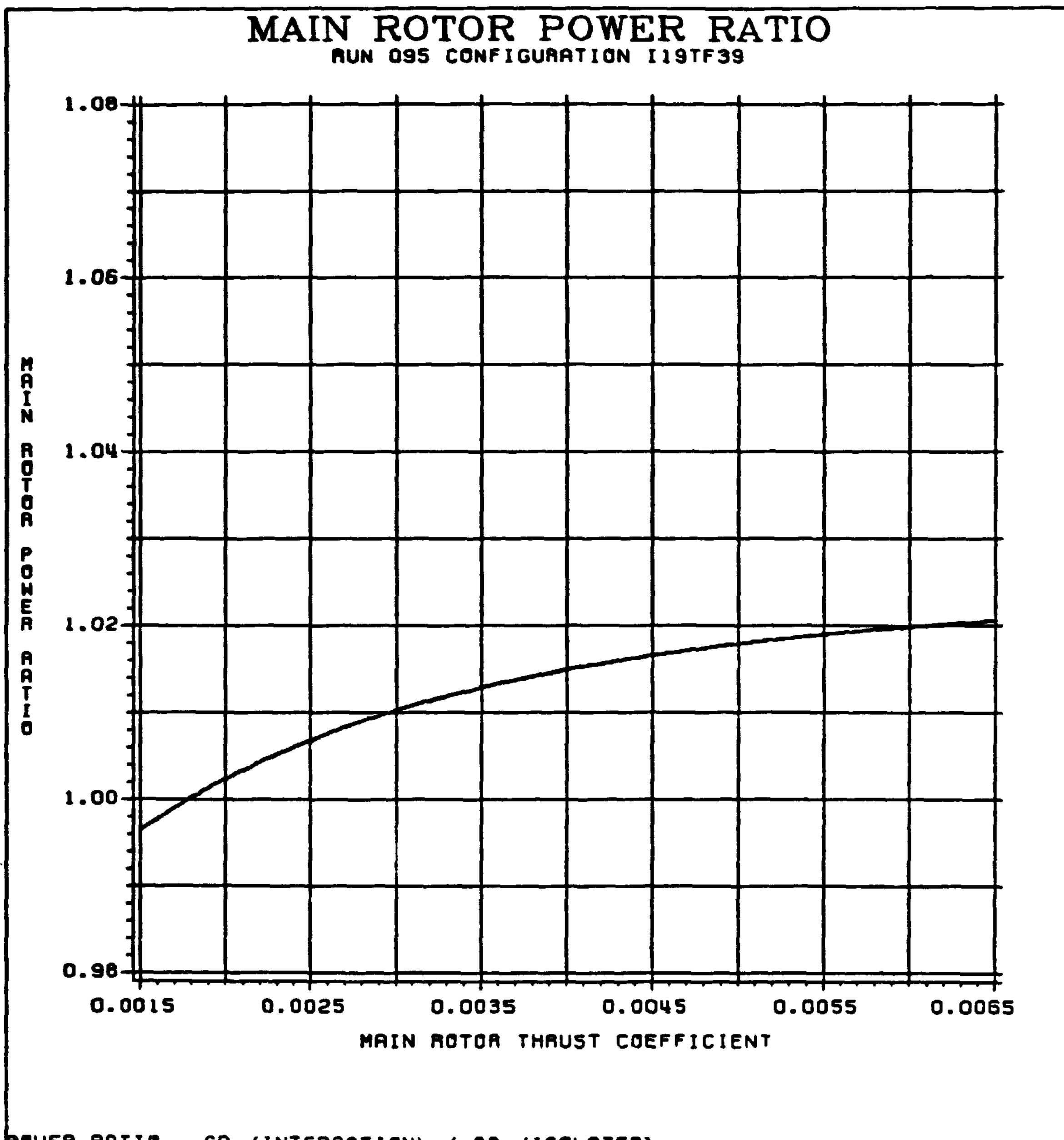
ORIGINAL PAGE IS
OF POOR QUALITY



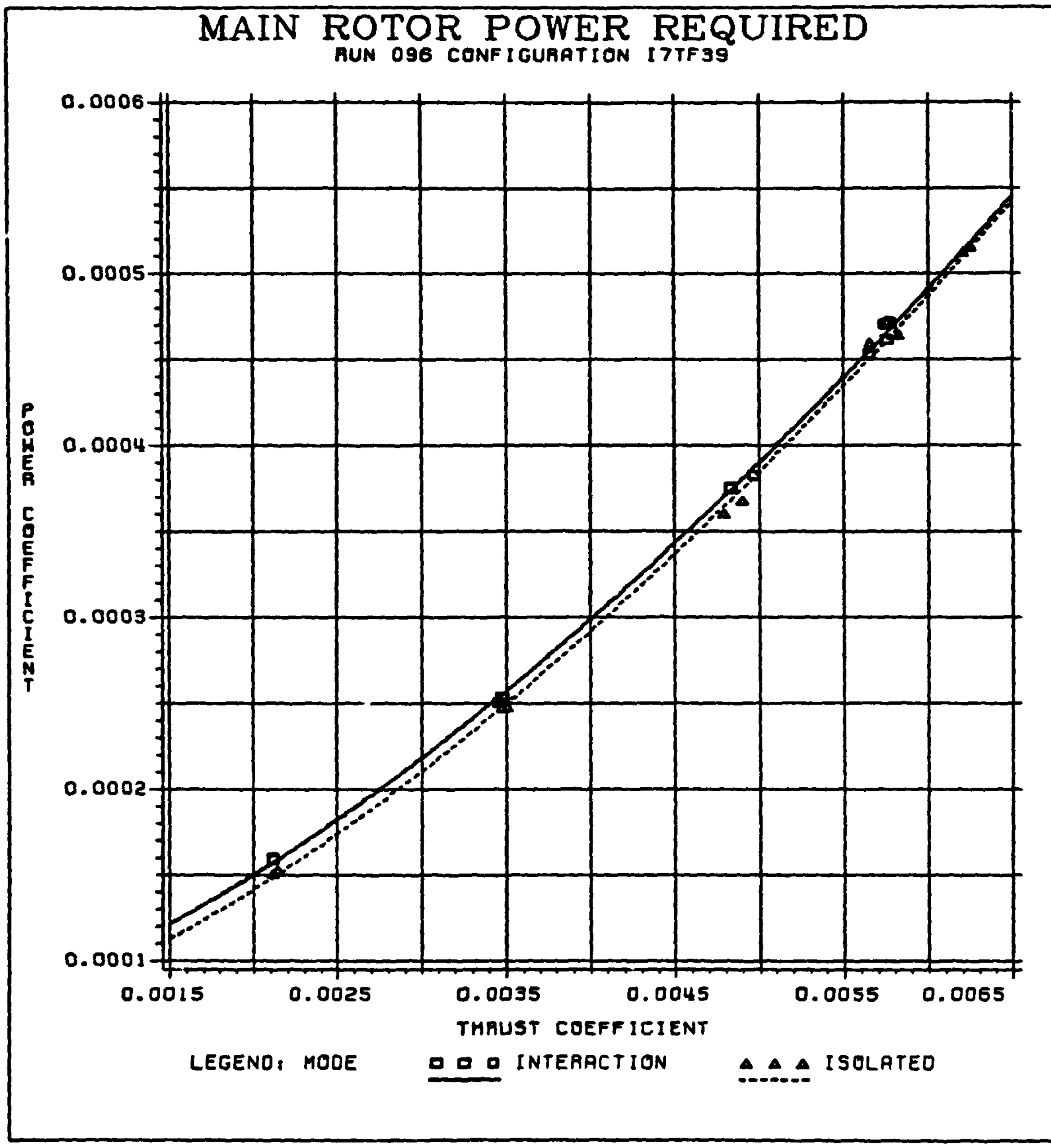

MAIN ROTOR POWER RATIO
RUN 093 CONFIGURATION I16TF39
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

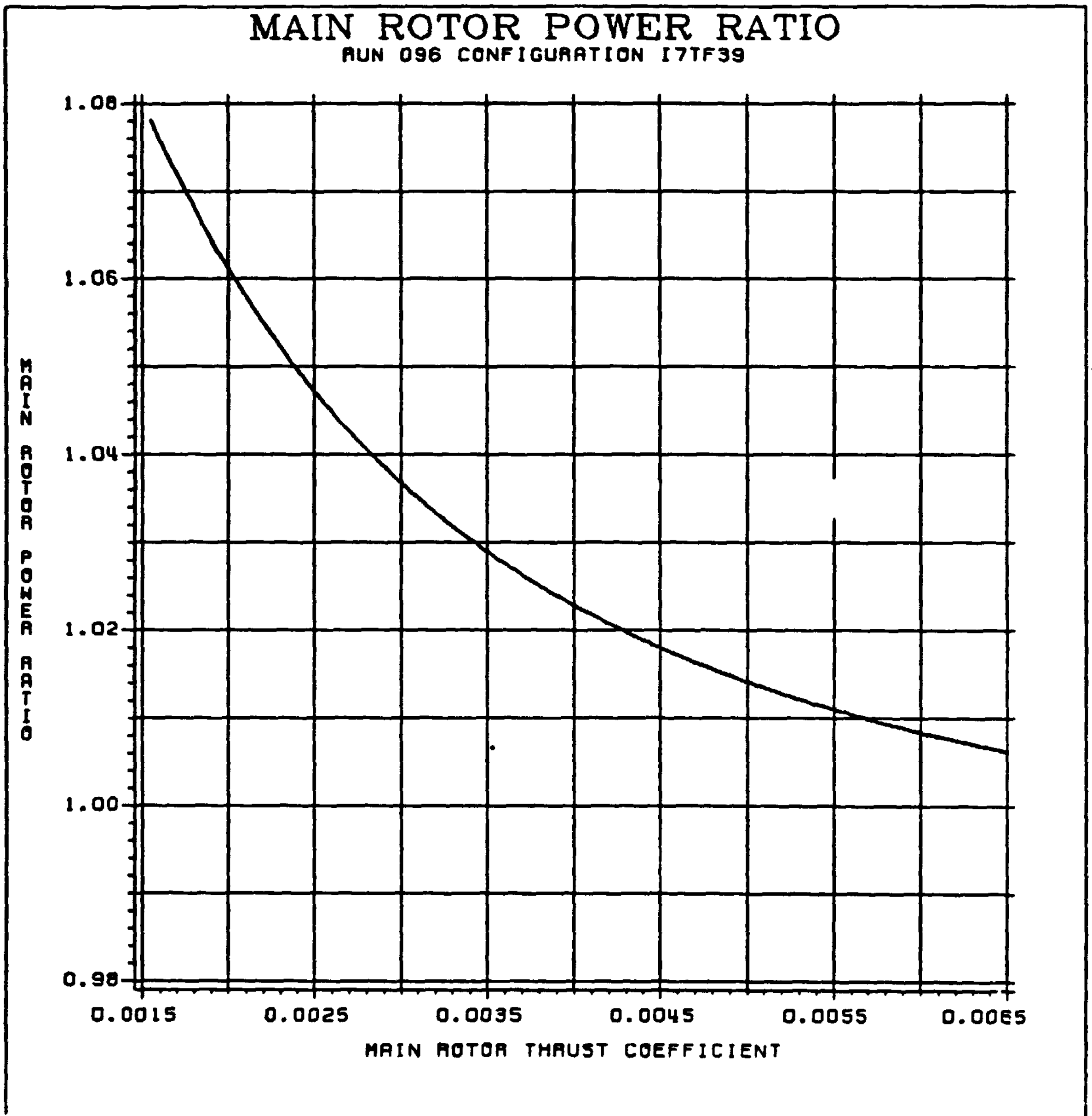
ORIGINAL PAGE IS
OF POOR QUALITY




MAIN ROTOR POWER RATIO
RUN 095 CONFIGURATION I19TF39
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

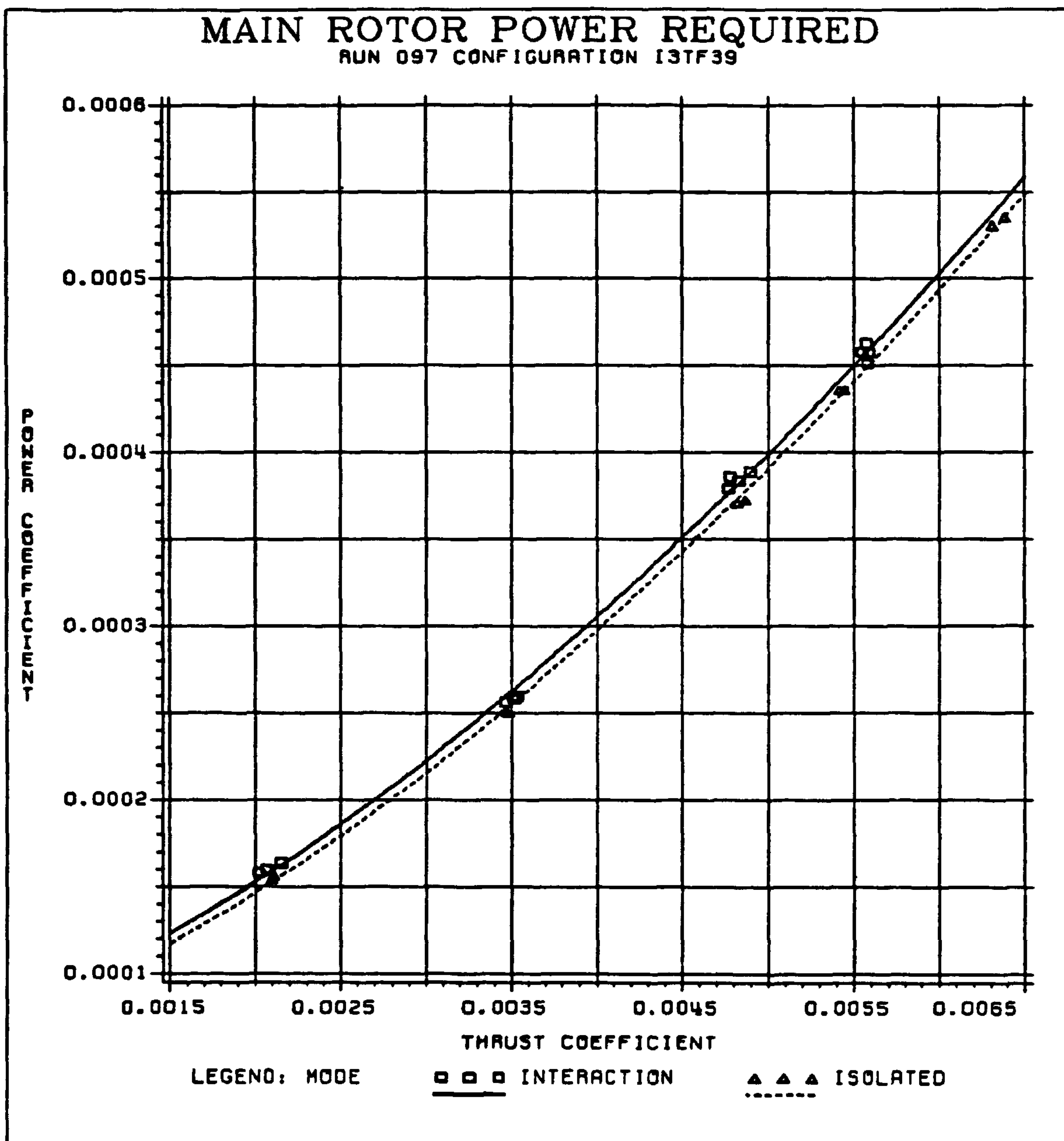
ORIGINAL PAGE IS
OF POOR QUALITY

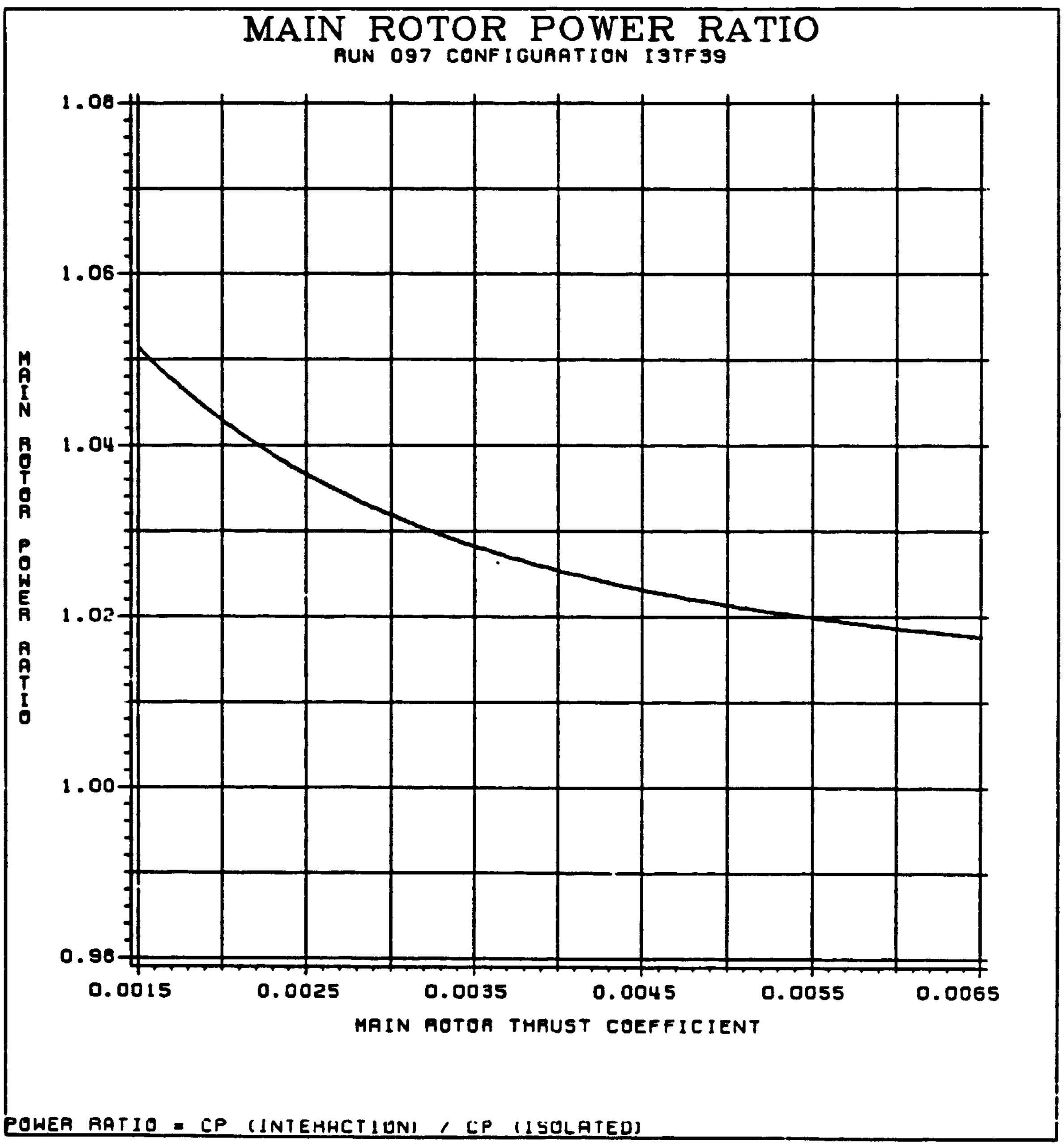




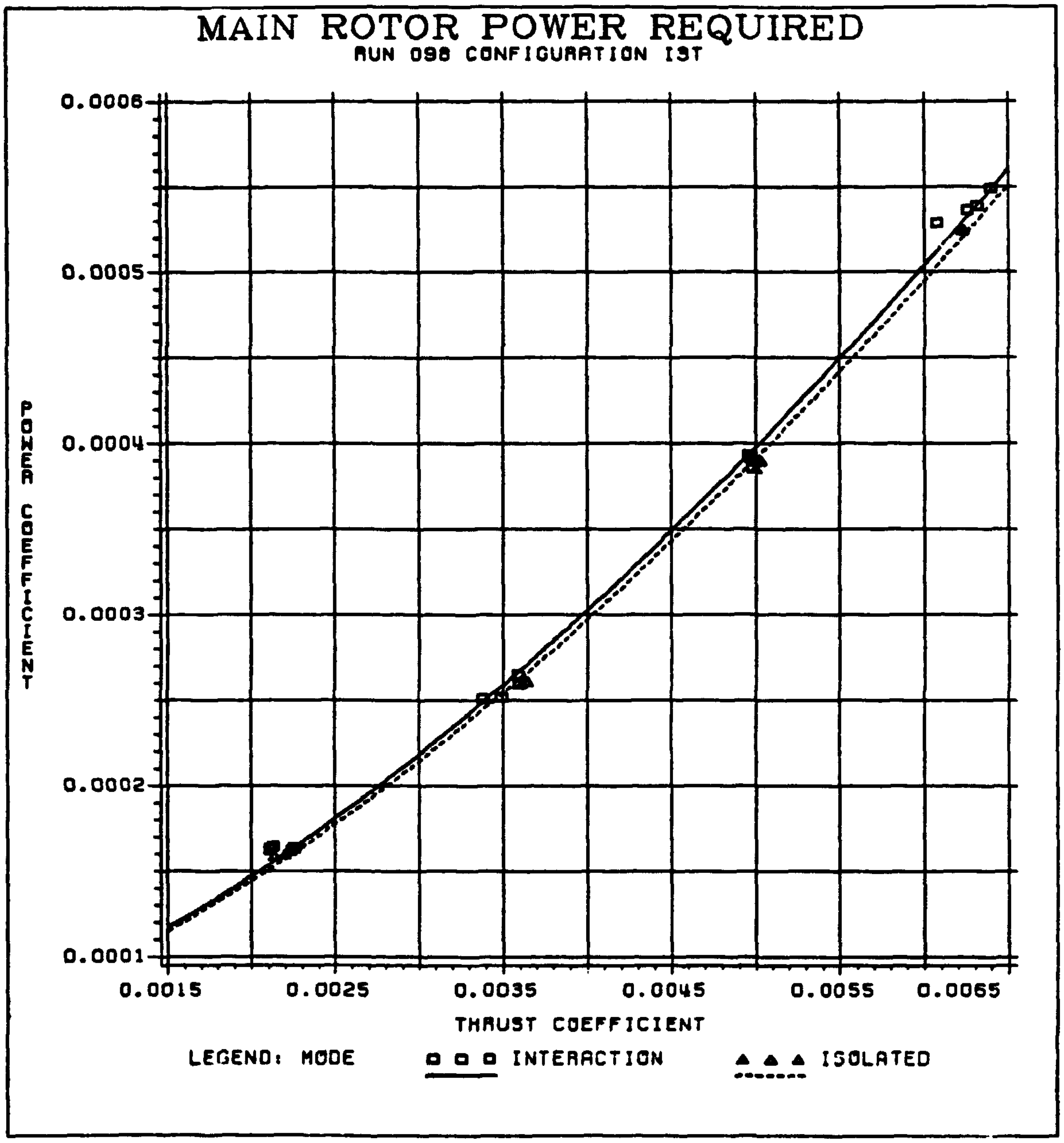
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

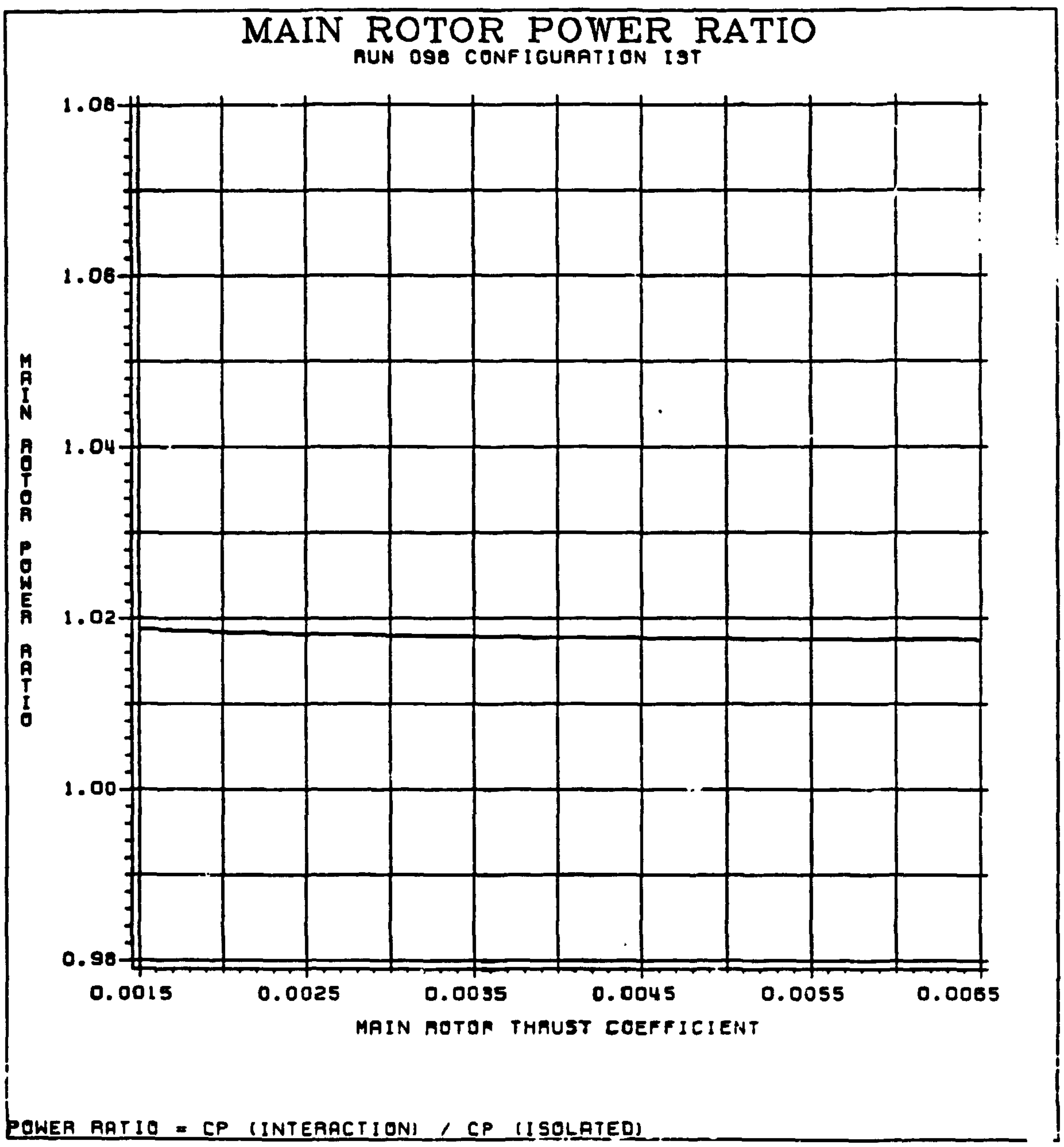
ORIGINAL PAGE IS
OF POOR QUALITY



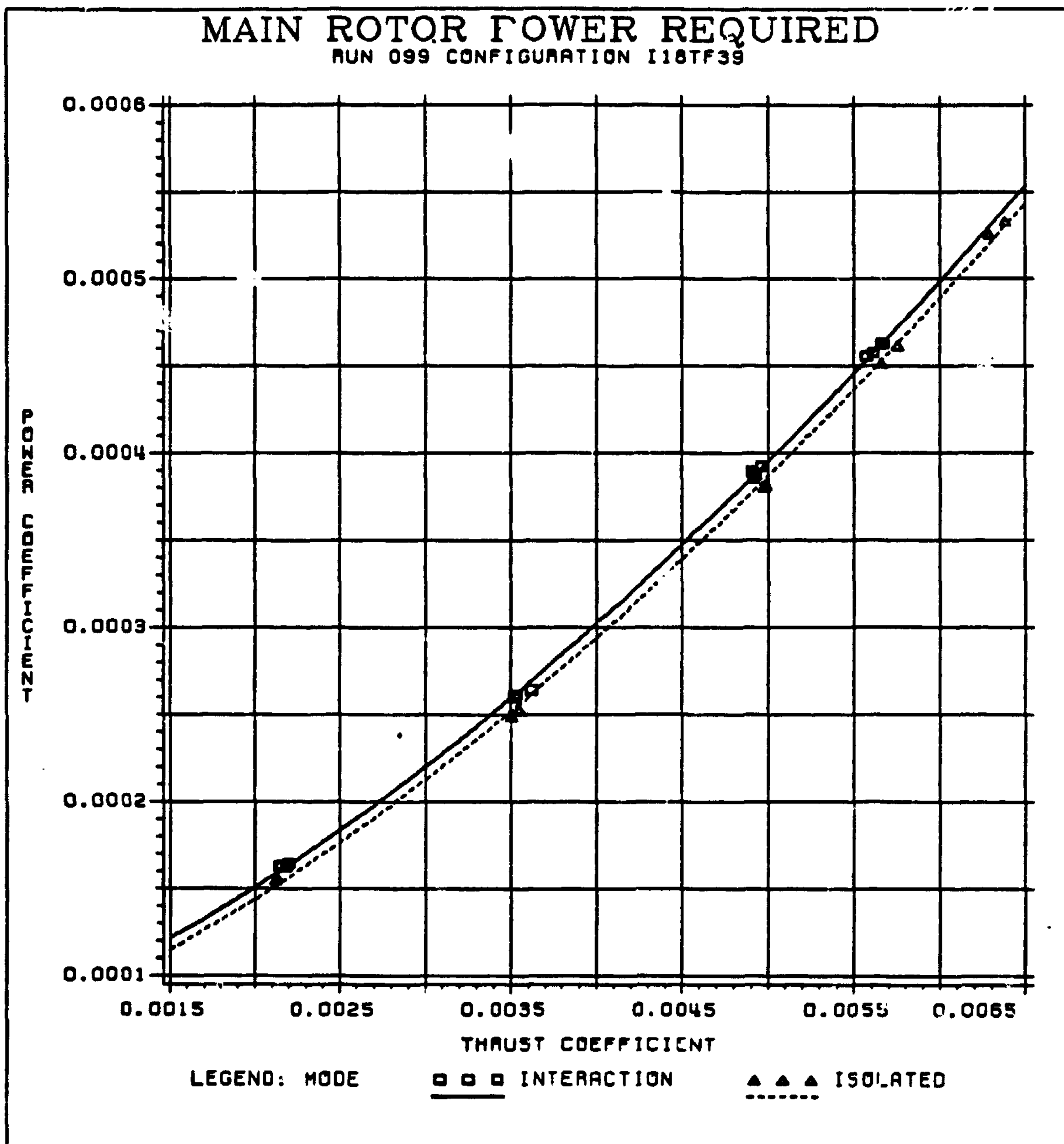


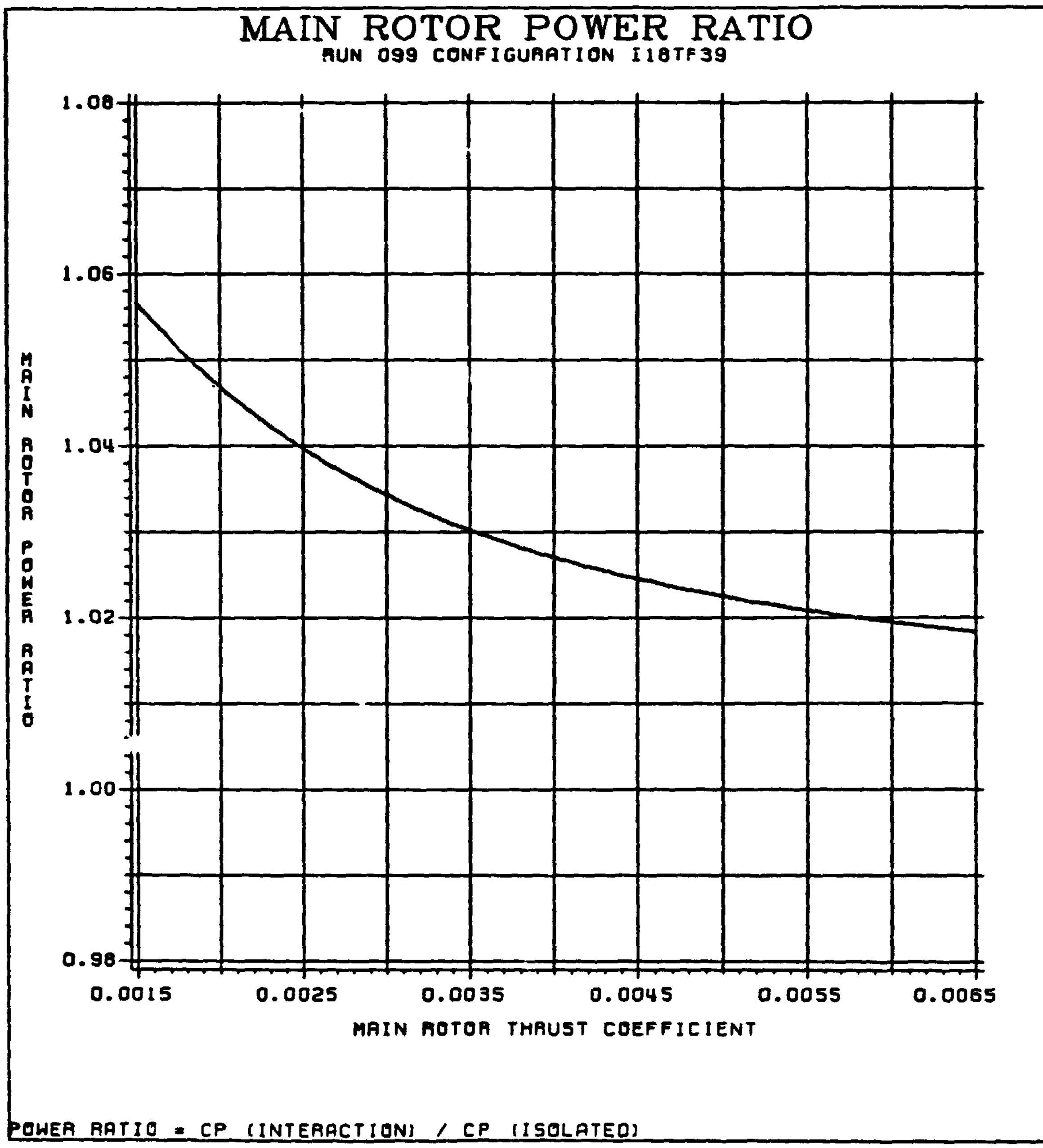
MAIN ROTOR POWER RATIO
RUN 097 CONFIGURATION I3TF39
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)


MAIN ROTOR POWER REQUIRED
RUN 098 CONFIGURATION IST
POWER COEFFICIENT
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
THRUST COEFFICIENT
LEGEND: MODE
INTERACTION
ISOLATED

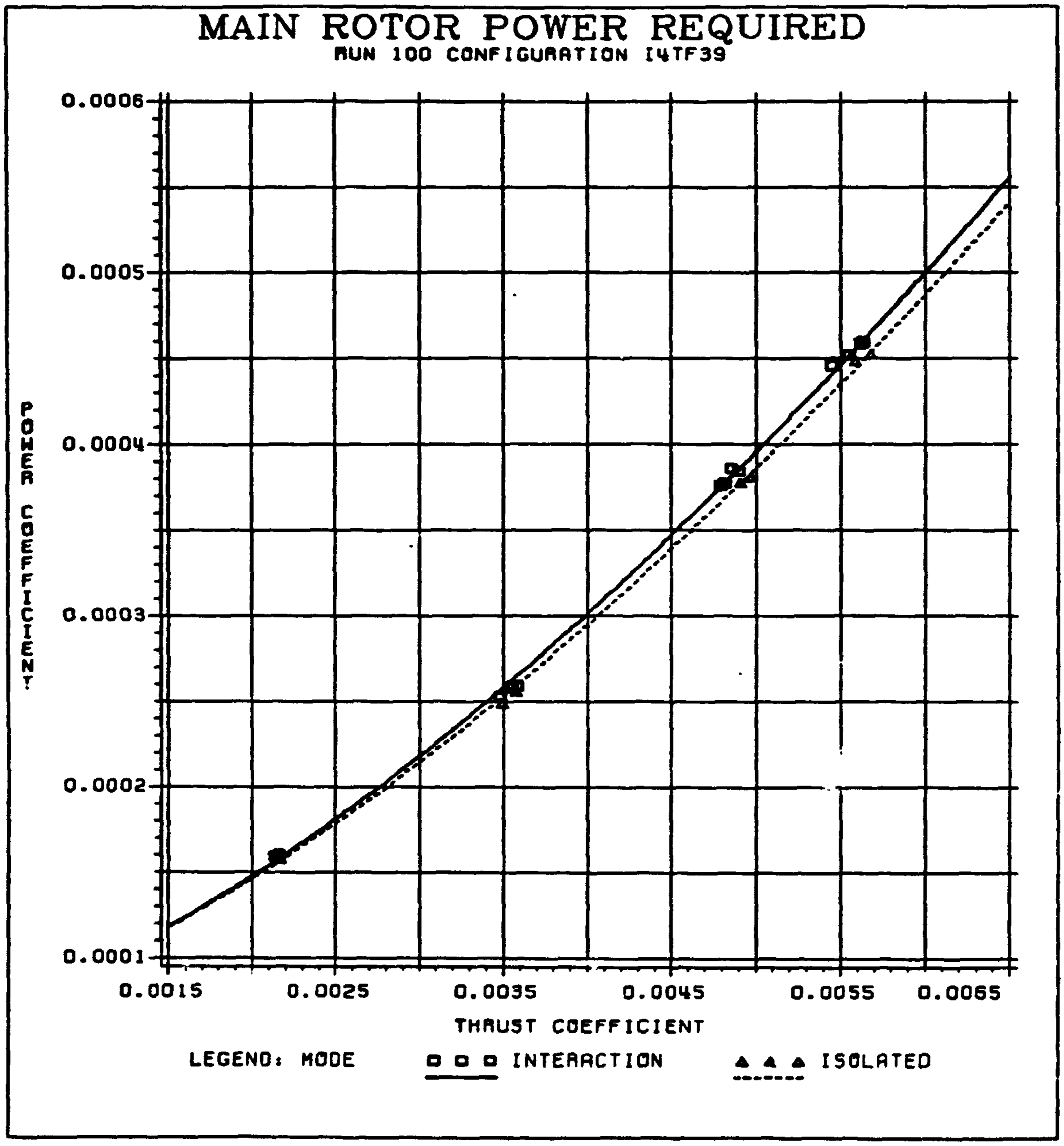

MAIN ROTOR POWER RATIO
RUN 098 CONFIGURATION IST
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

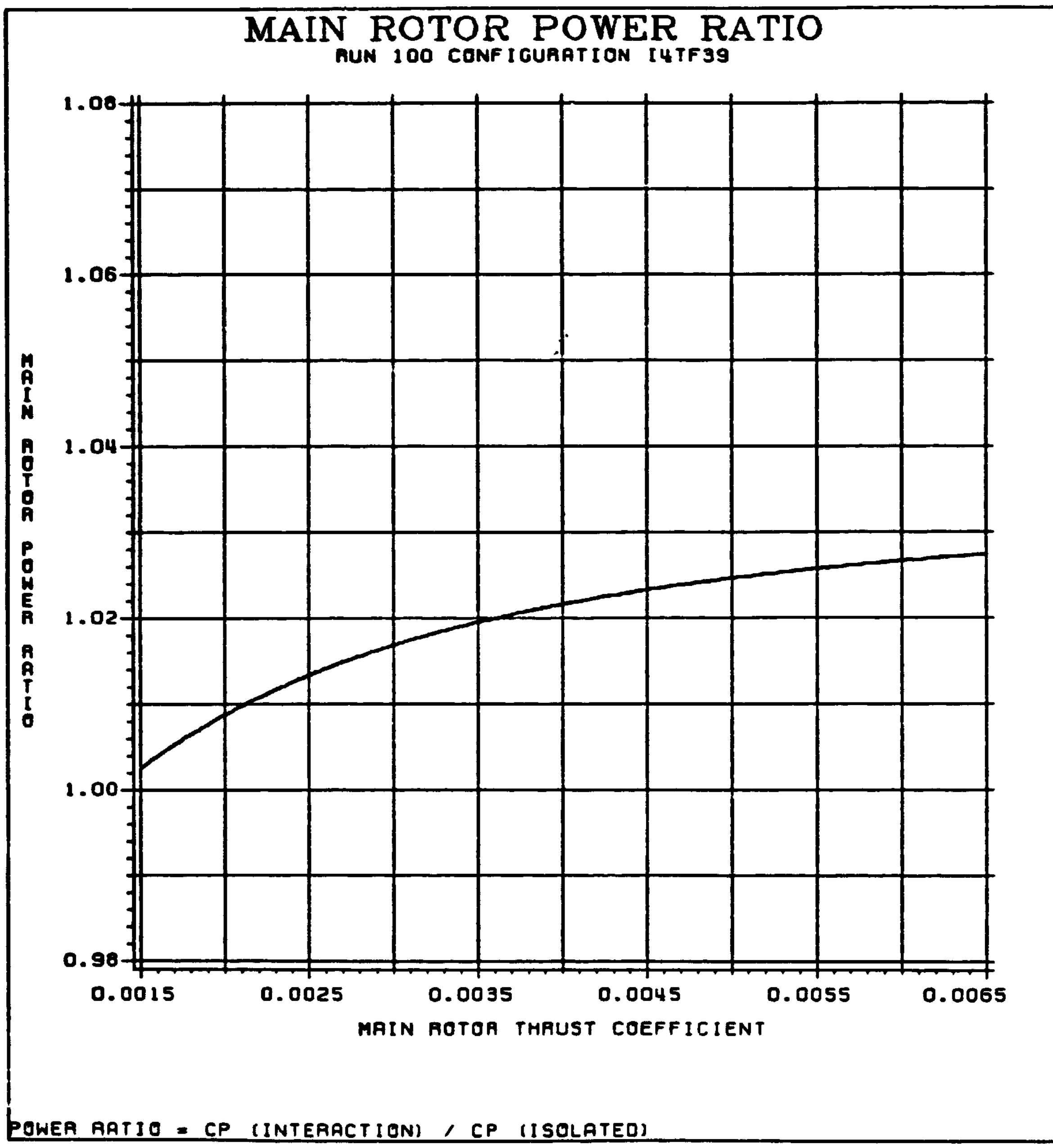
ORIGINAL PAGE IS
OF POOR QUALITY



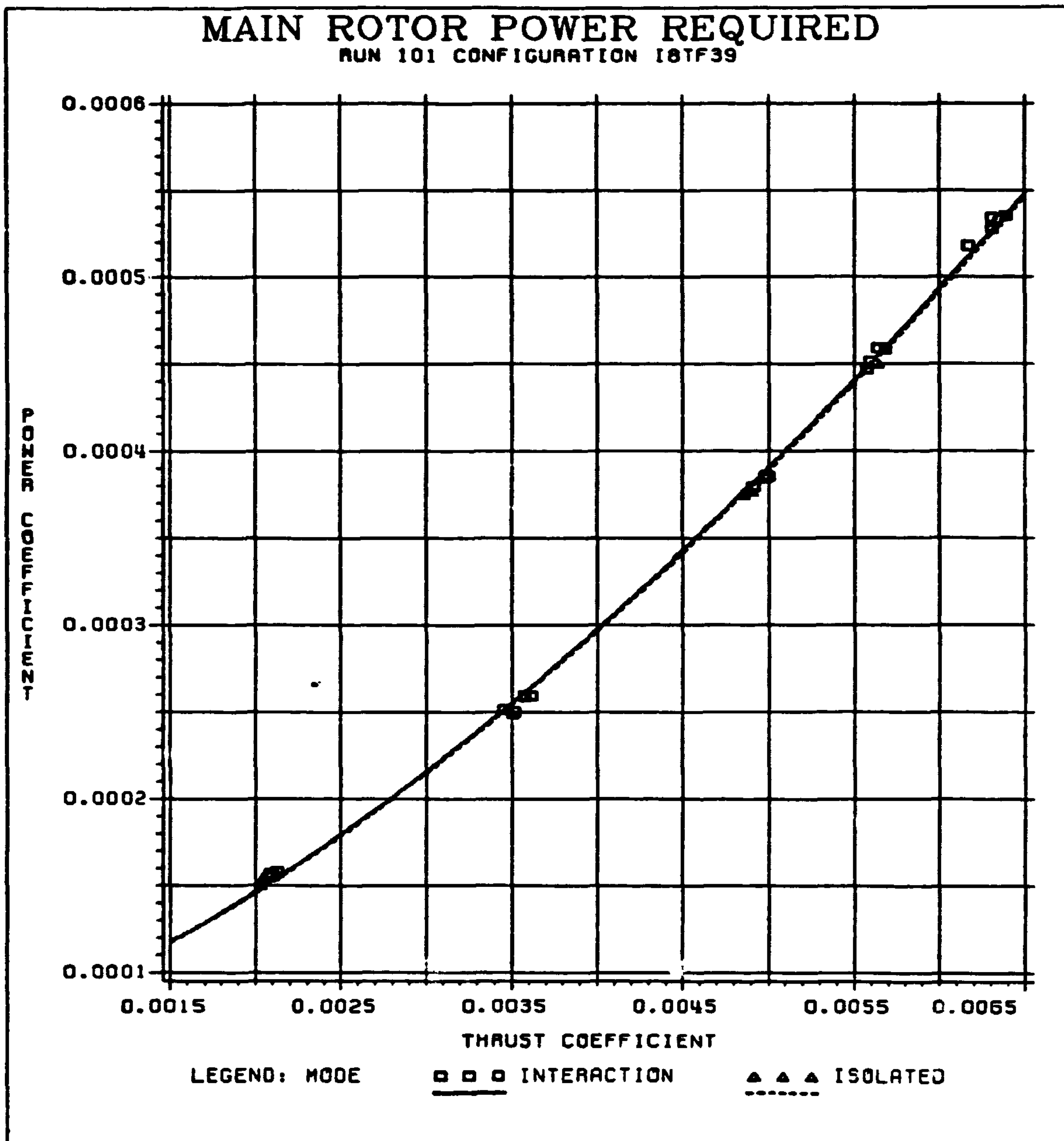

MAIN ROTOR POWER RATIO
RUN 099 CONFIGURATION I18TF39
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

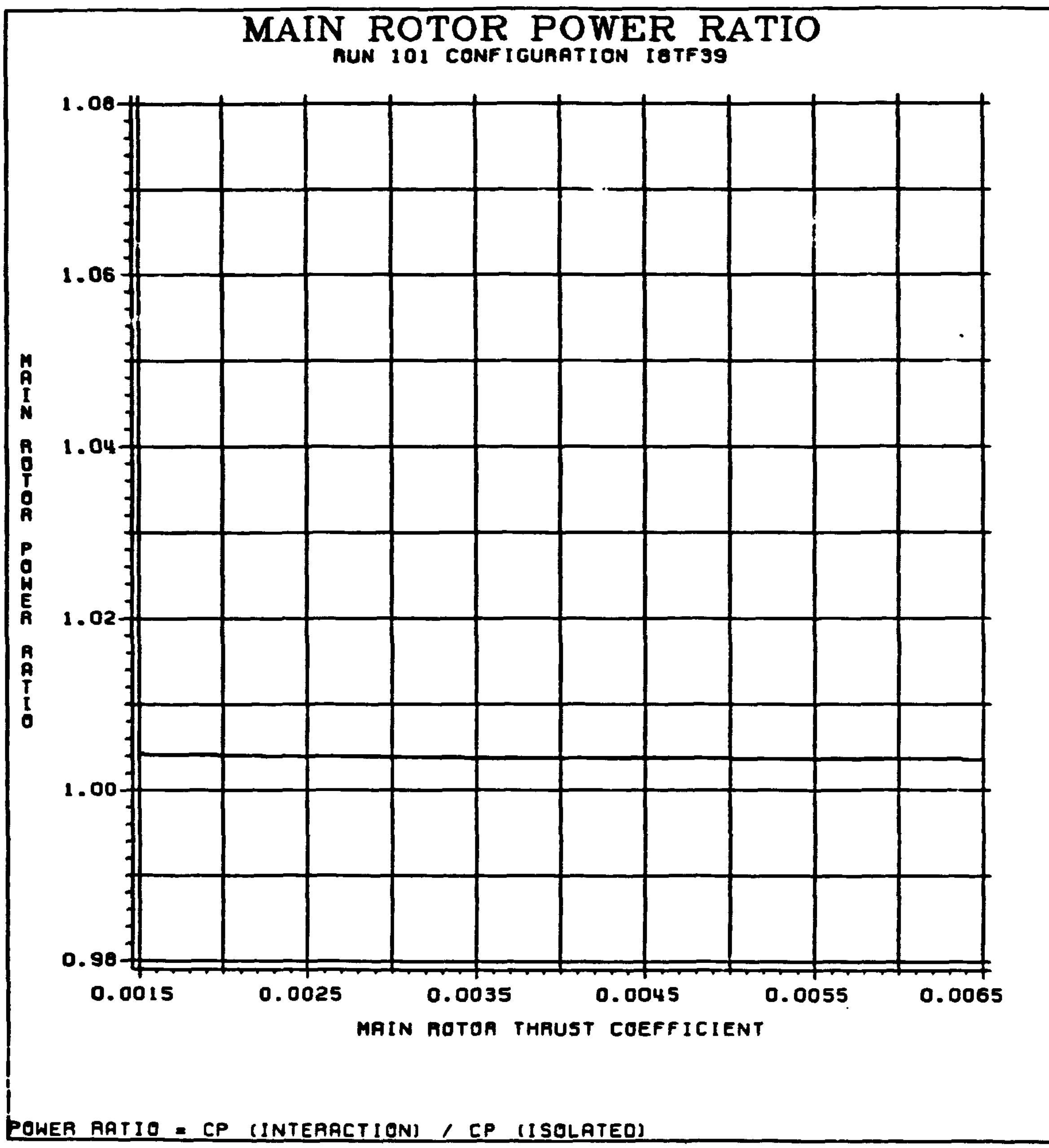
ORIGINAL PAGE IS
OF POOR QUALITY



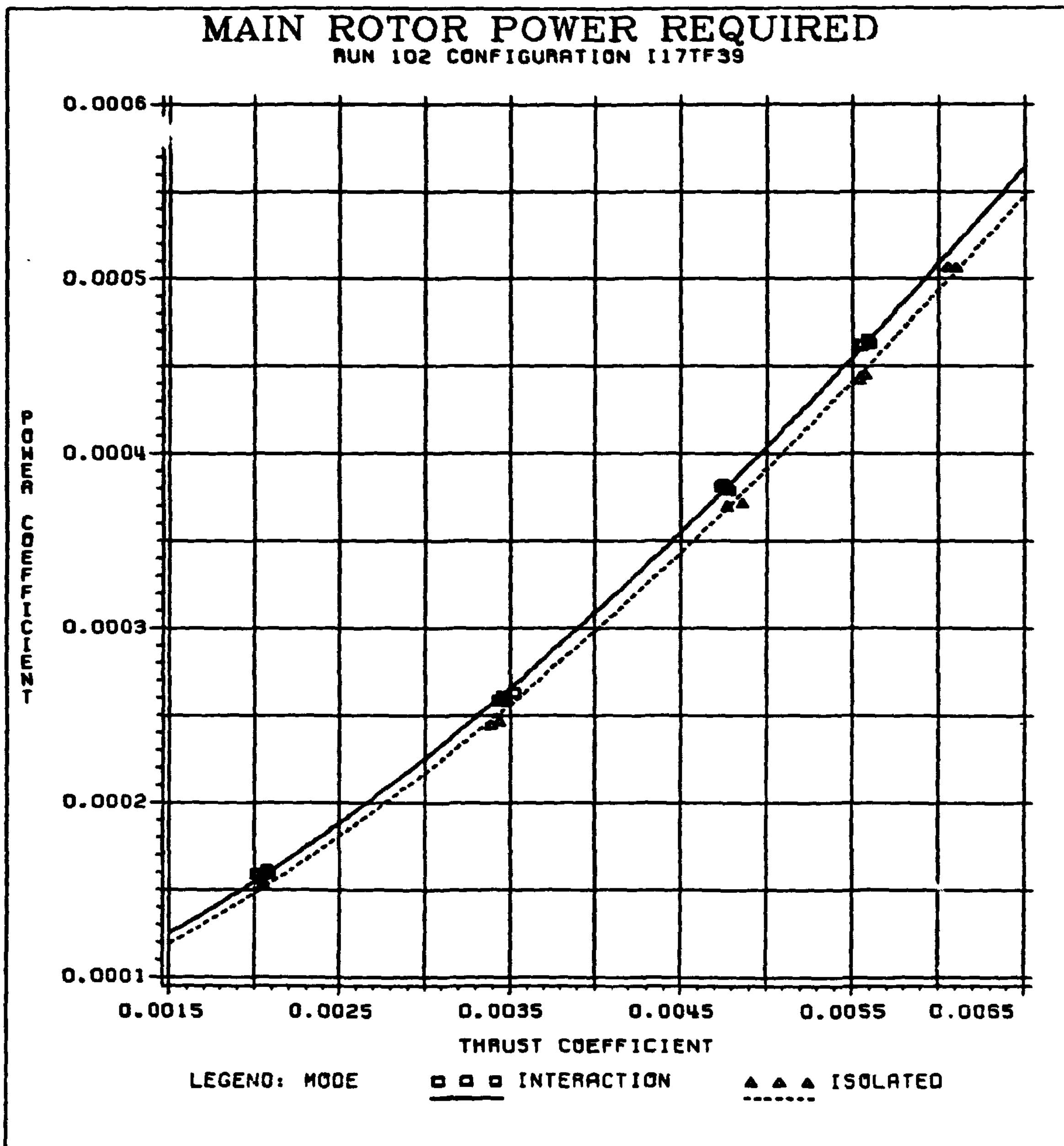

MAIN ROTOR POWER RATIO
RUN 100 CONFIGURATION I4TF39
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

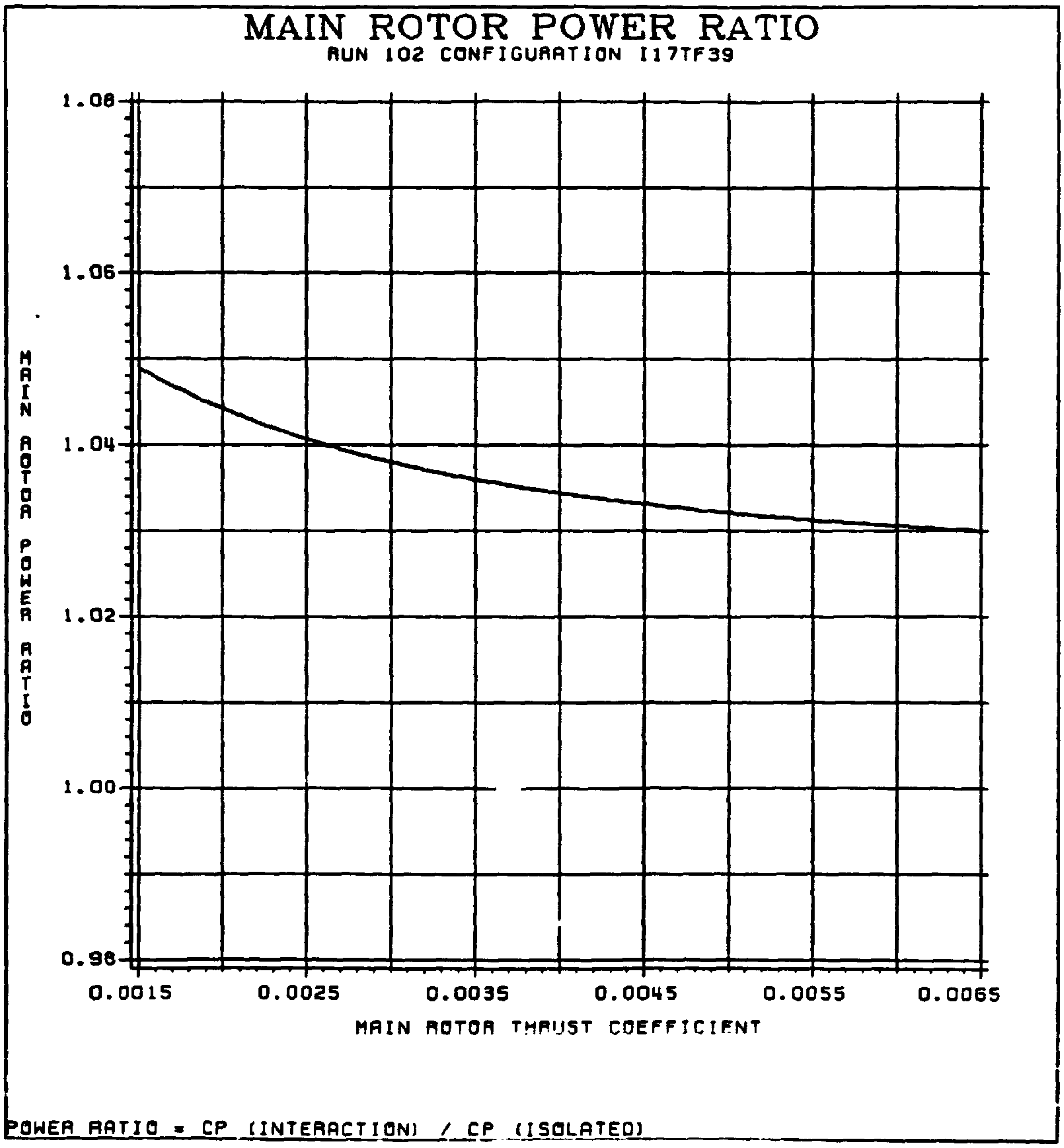
ORIGINAL PAGE IS
OF POOR QUALITY

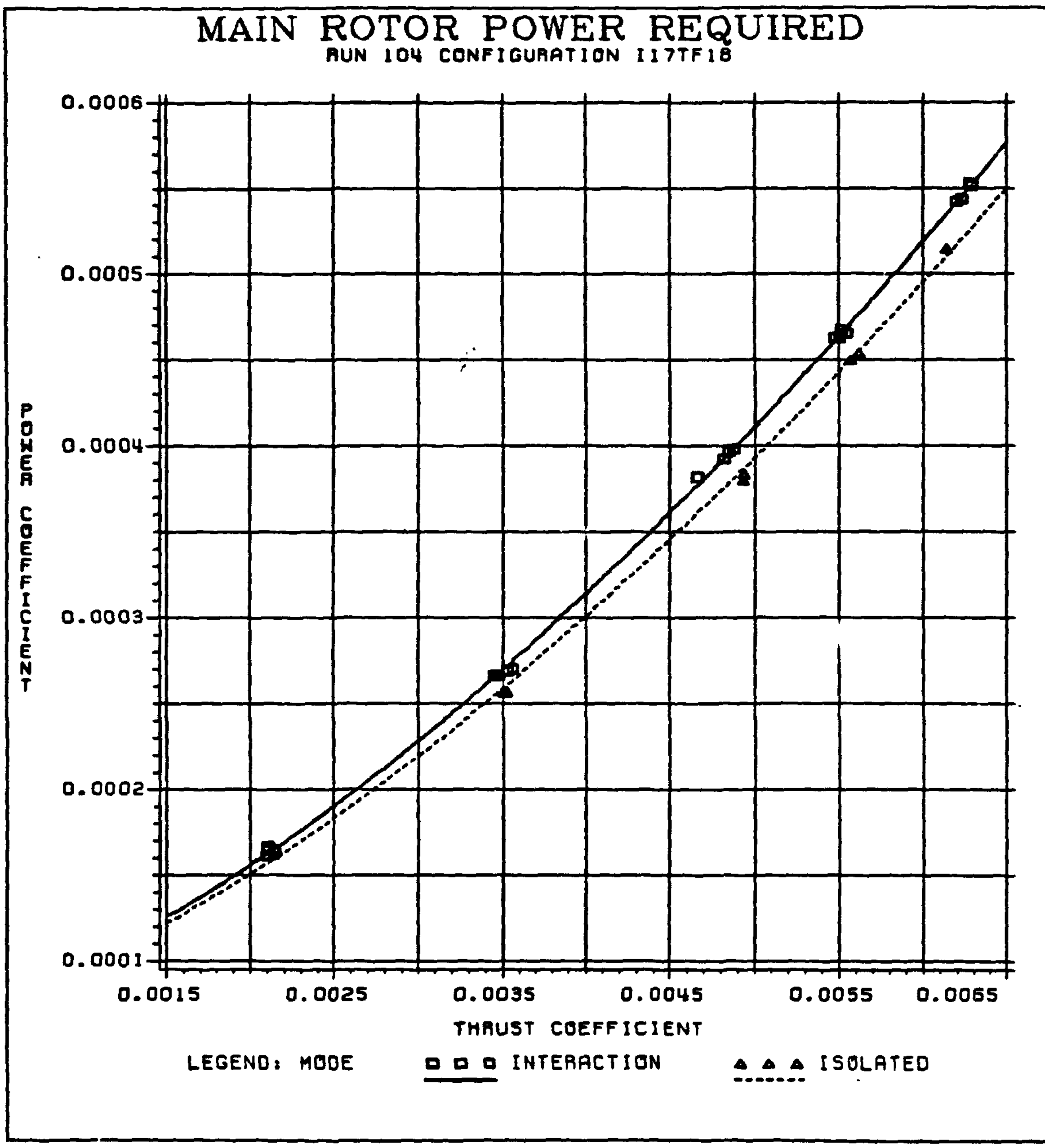


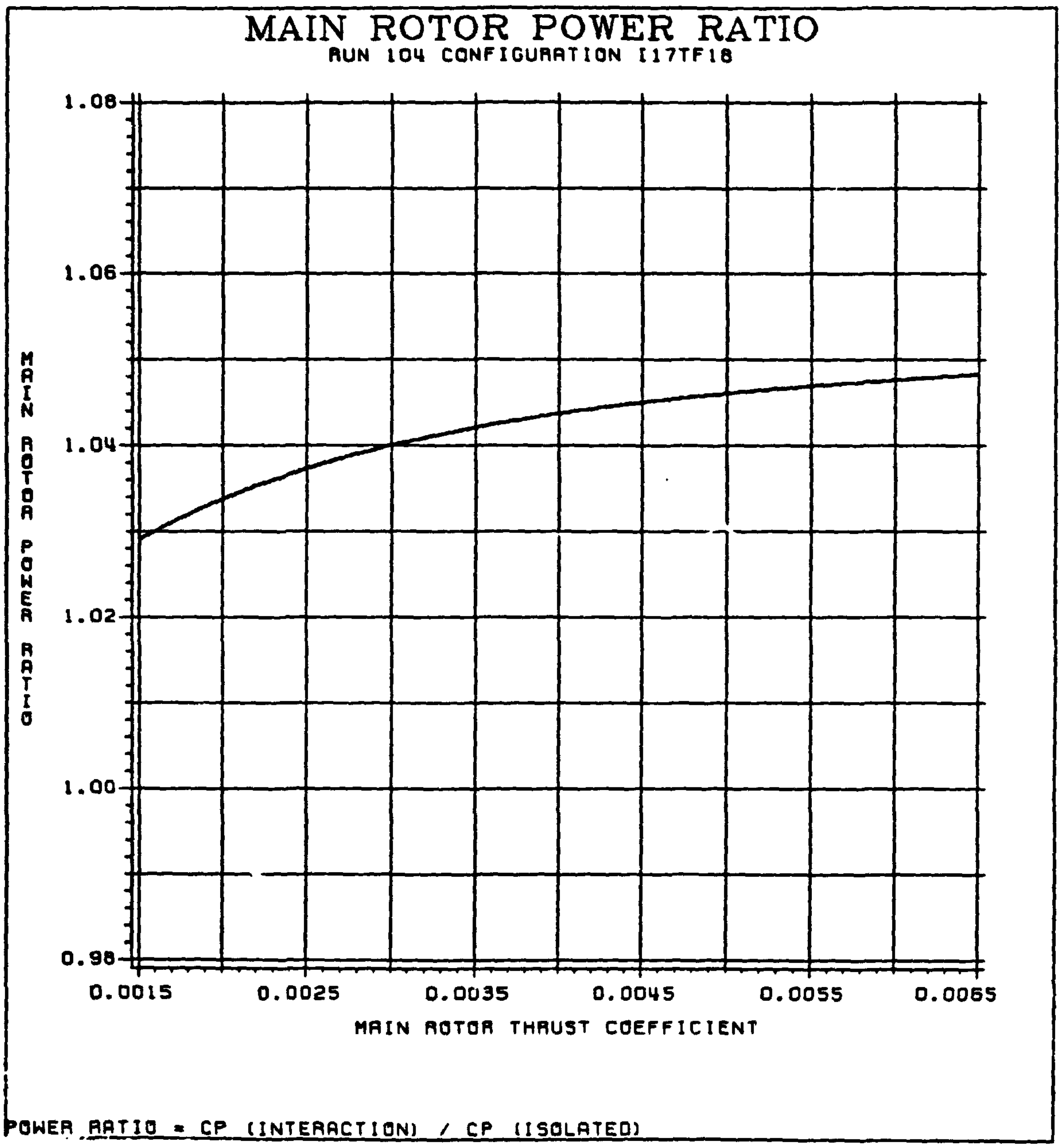

MAIN ROTOR POWER RATIO
RUN 101 CONFIGURATION I8TF39
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

ORIGINAL PAGE IS
OF POOR QUALITY

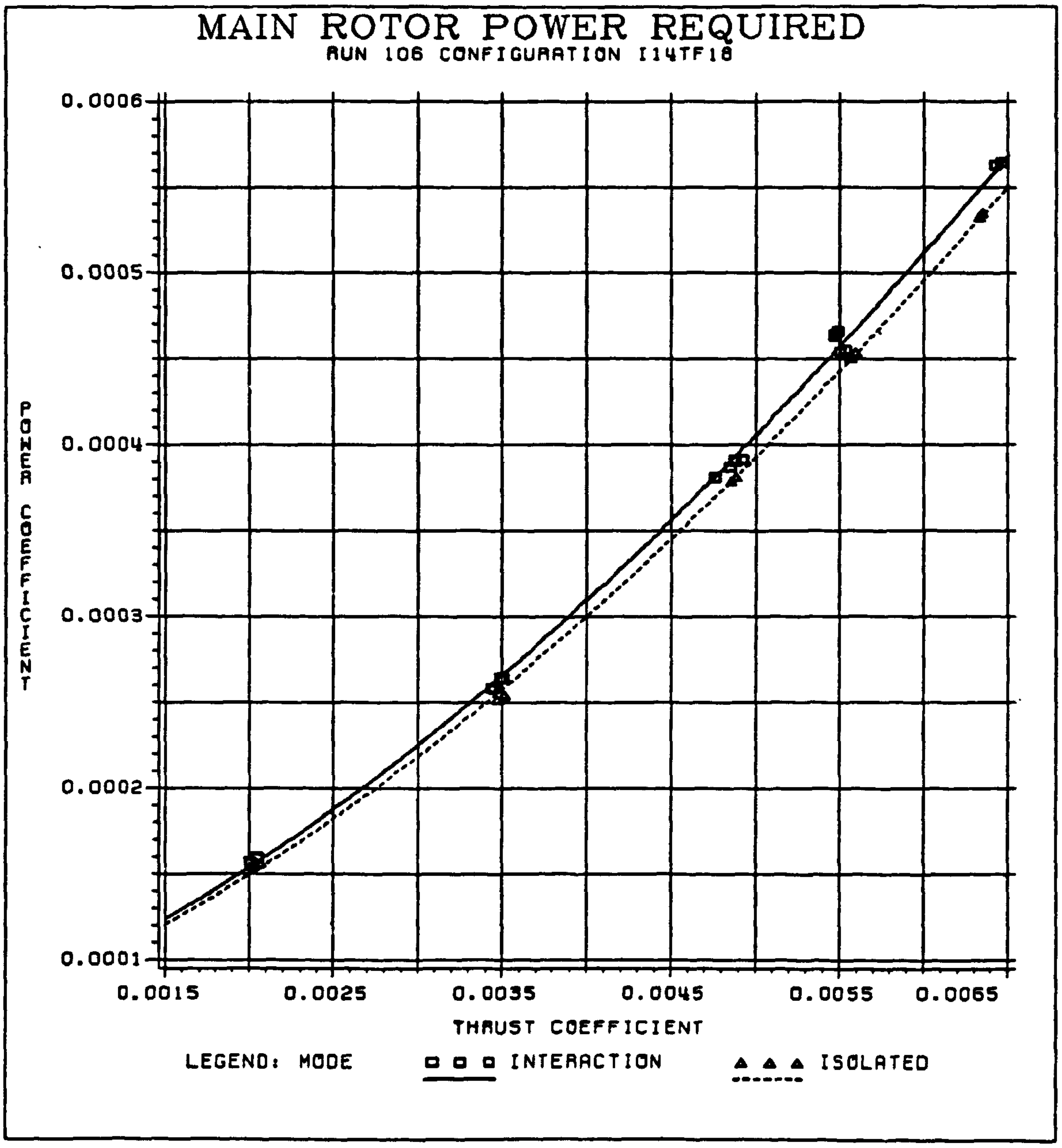


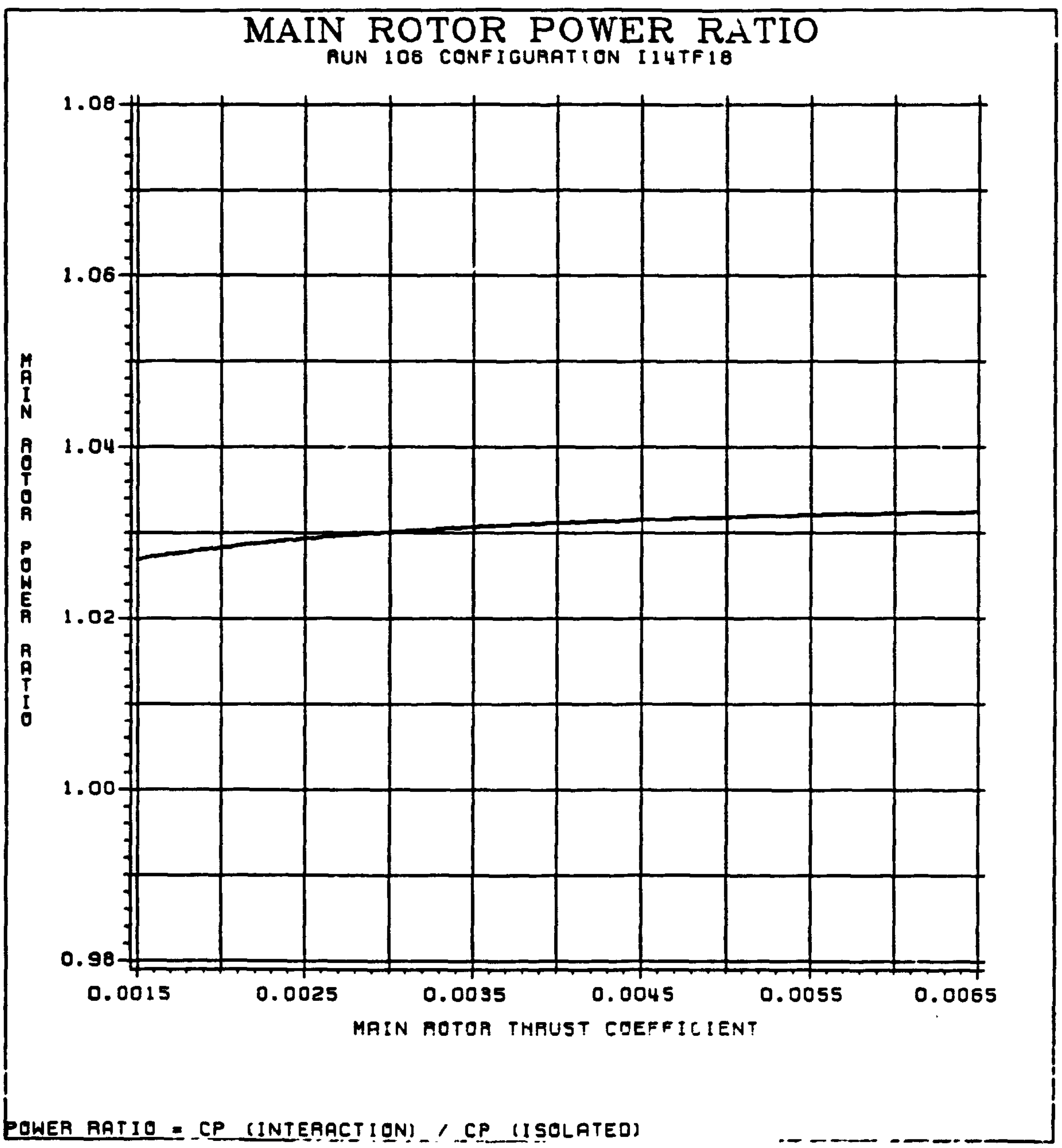

MAIN ROTOR POWER RATIO
RUN 102 CONFIGURATION I17TF39
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)


MAIN ROTOR POWER REQUIRED
RUN 104 CONFIGURATION I17TF18
POWER COEFFICIENT
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
THRUST COEFFICIENT
LEGEND: MODE
INTERACTION
ISOLATED

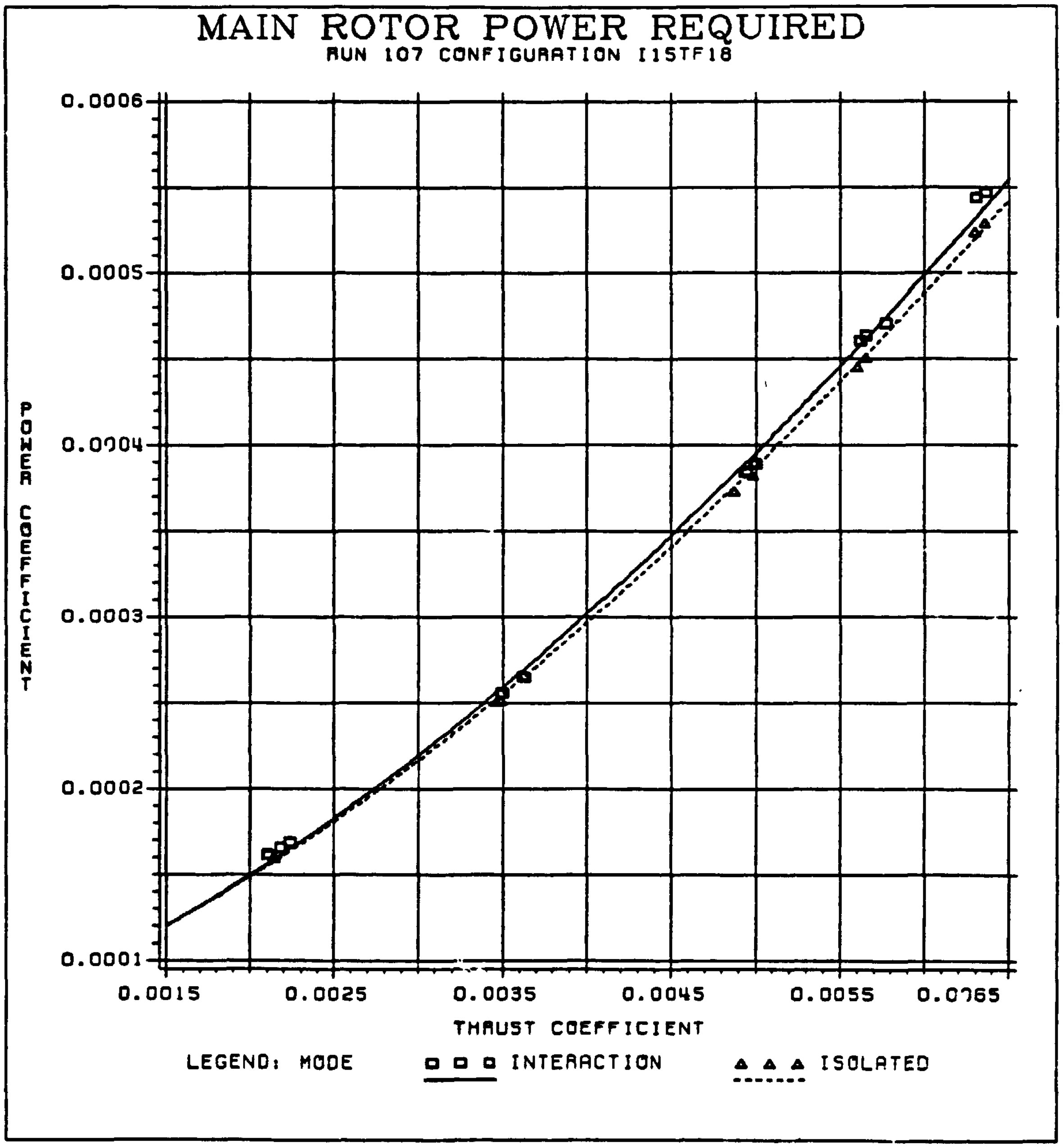

MAIN ROTOR POWER RATIO
RUN 104 CONFIGURATION I17TF18
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

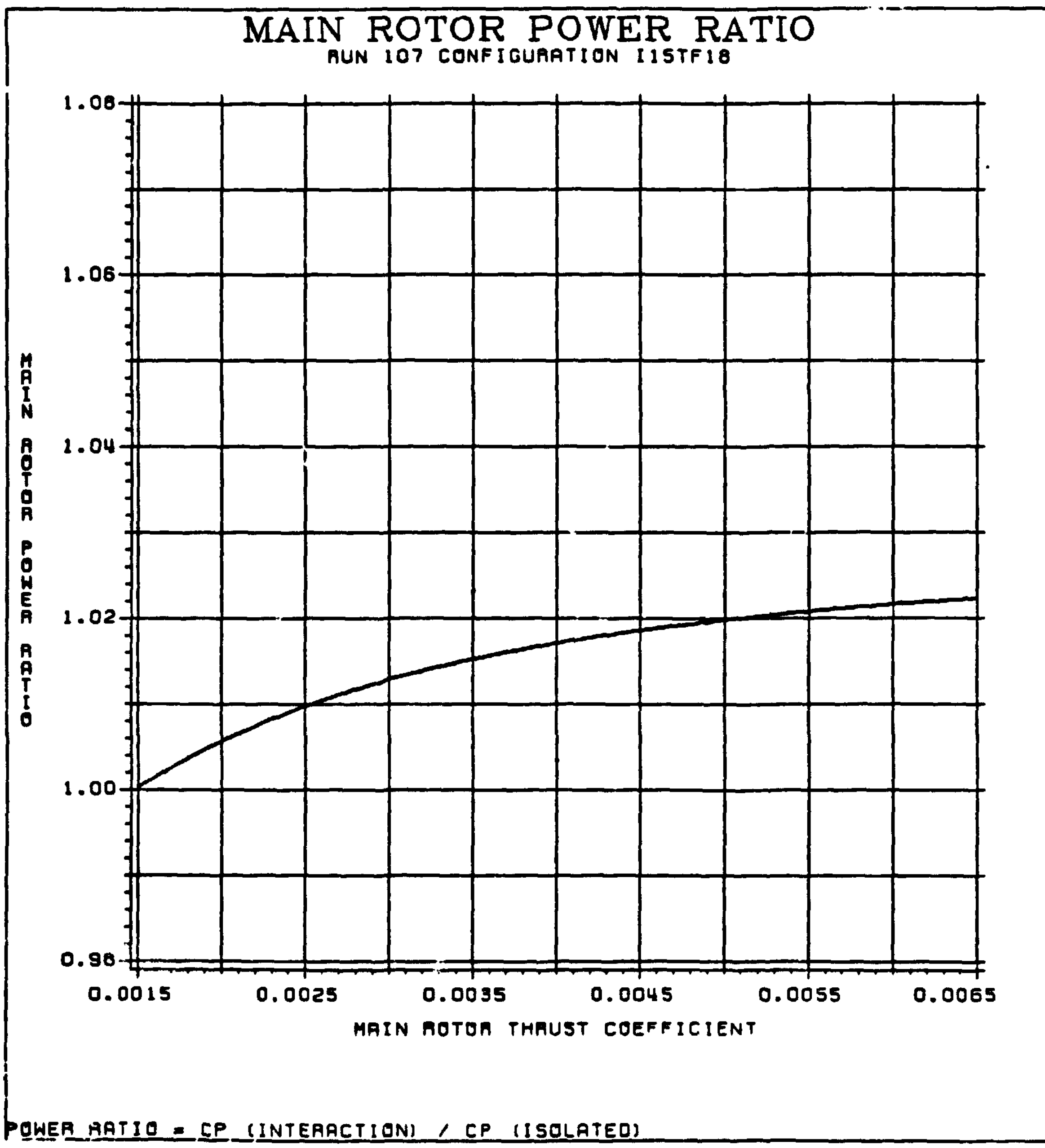
ORIGINAL PAGE IS
OF POOR QUALITY



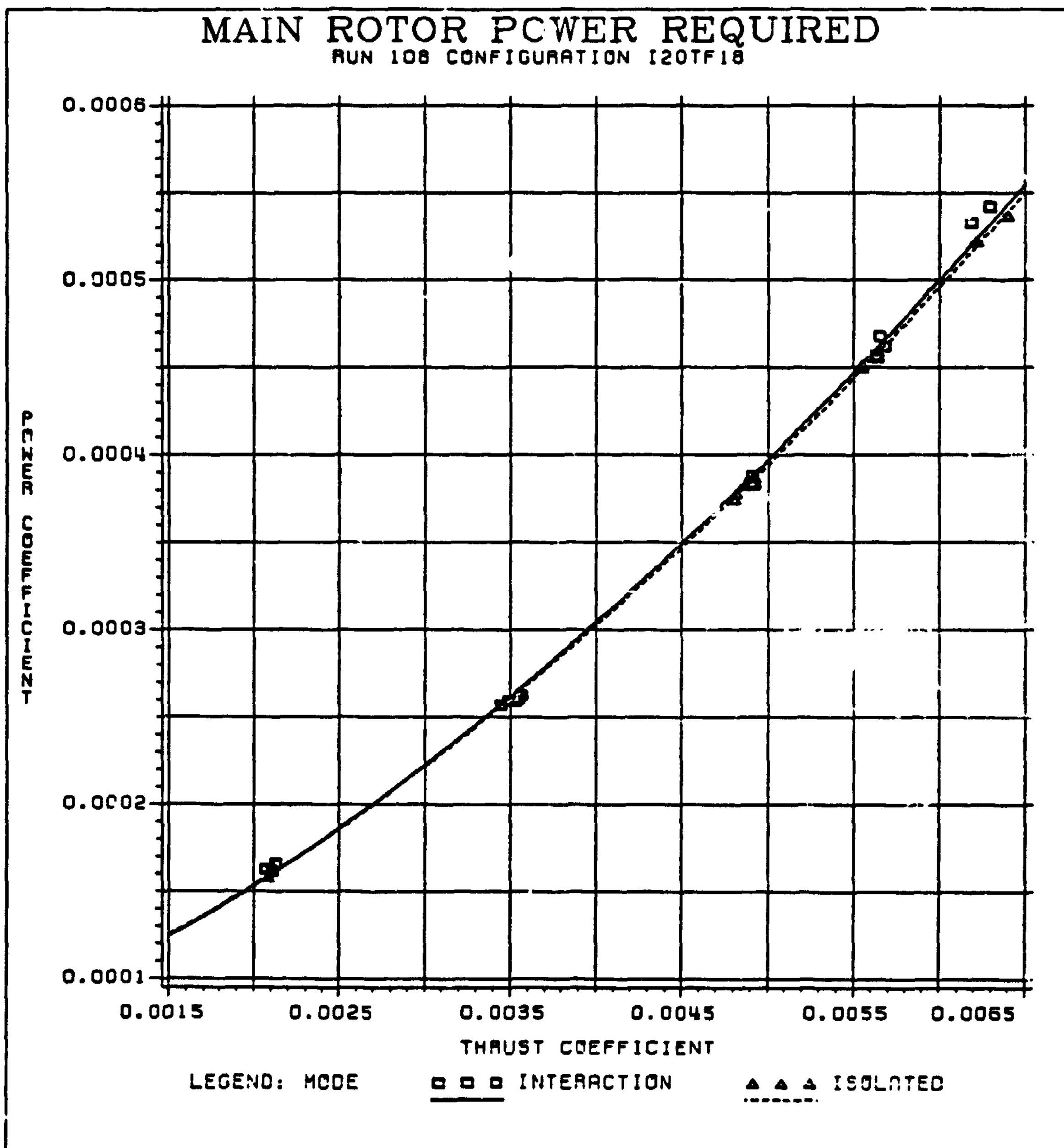

MAIN ROTOR POWER RATIO
RUN 106 CONFIGURATION I14TF18
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

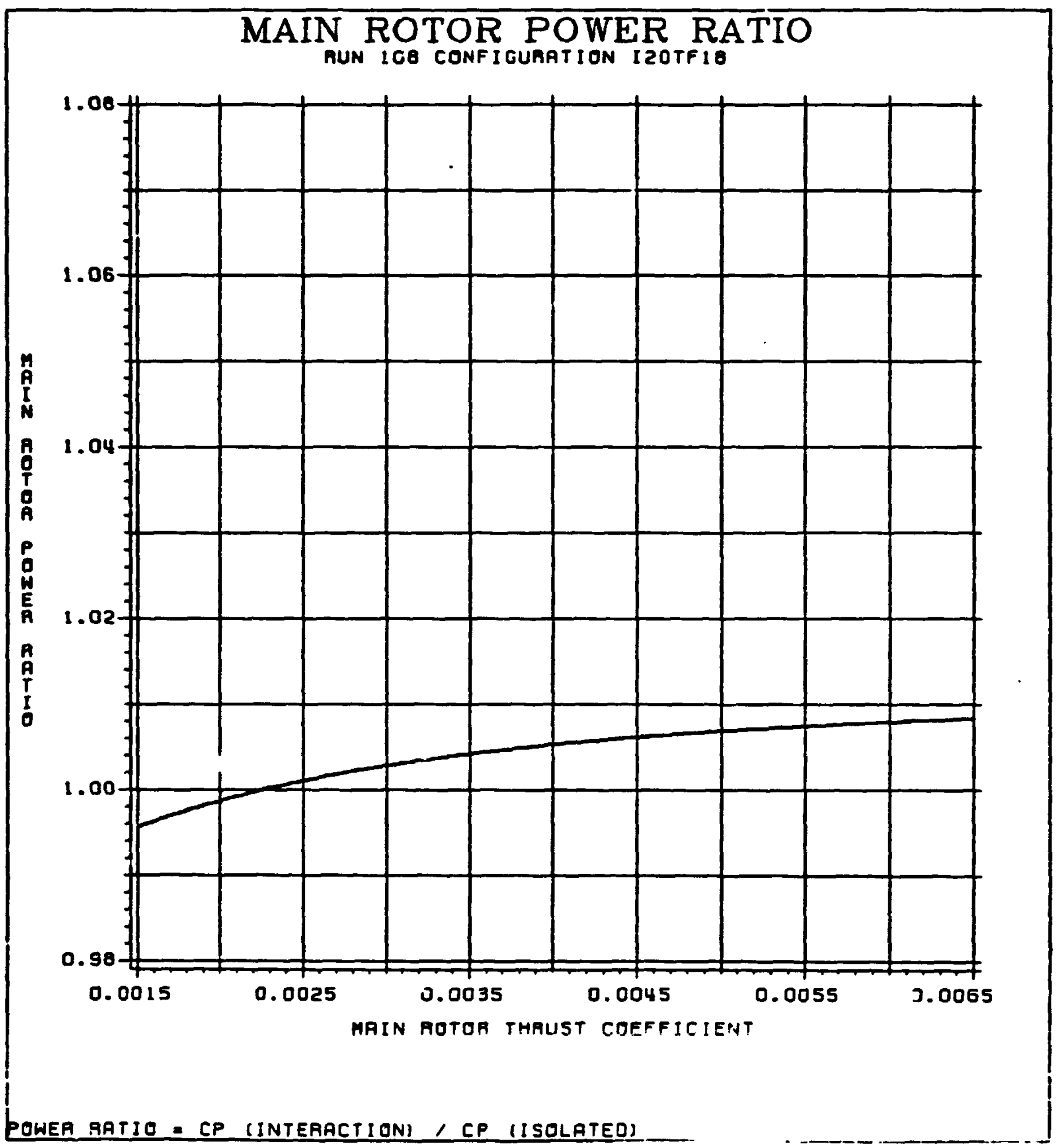
ORIGINAL PAGE IS OF POOR QUALITY



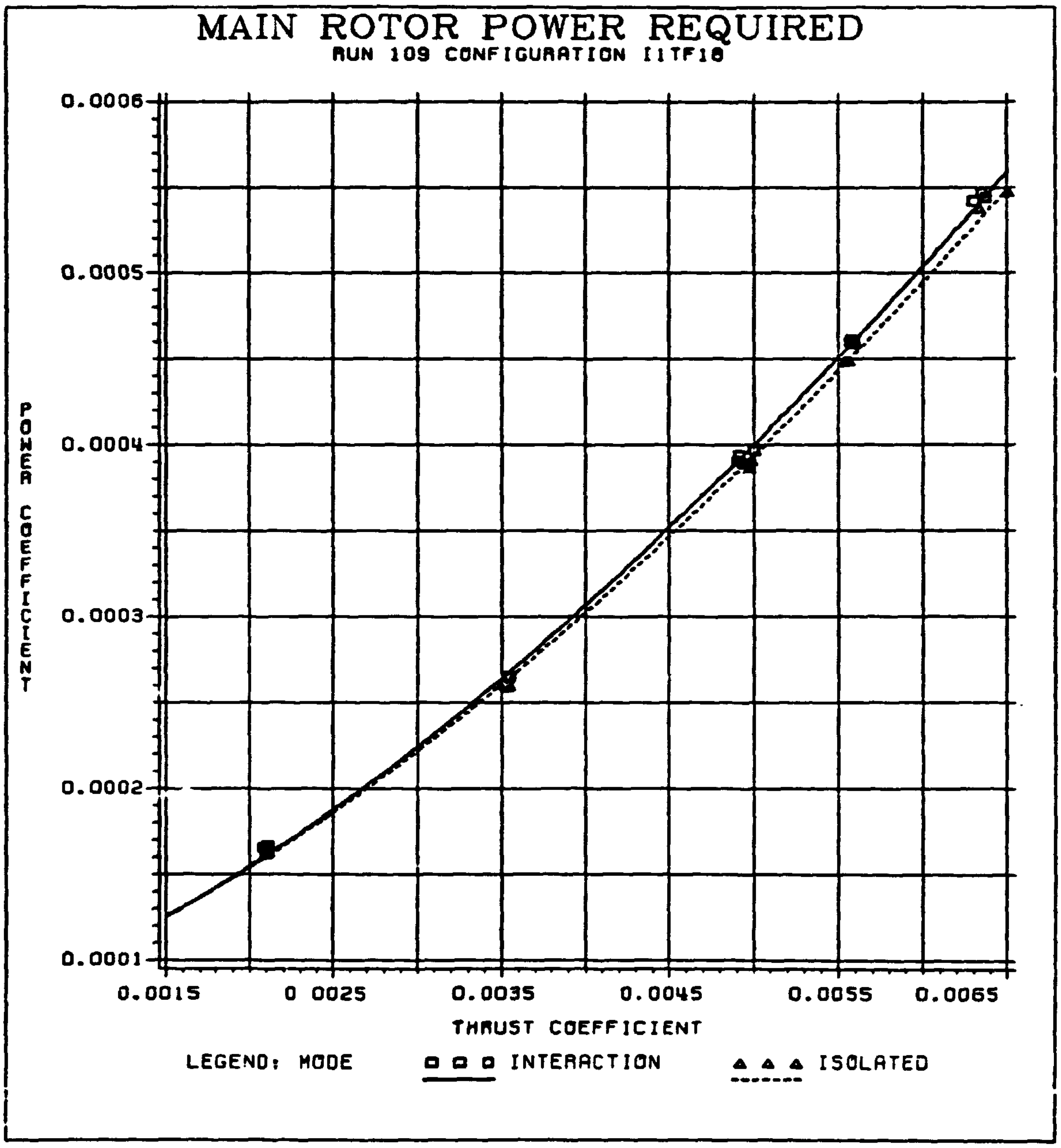

MAIN ROTOR POWER RATIO
RUN 107 CONFIGURATION I1STF18
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

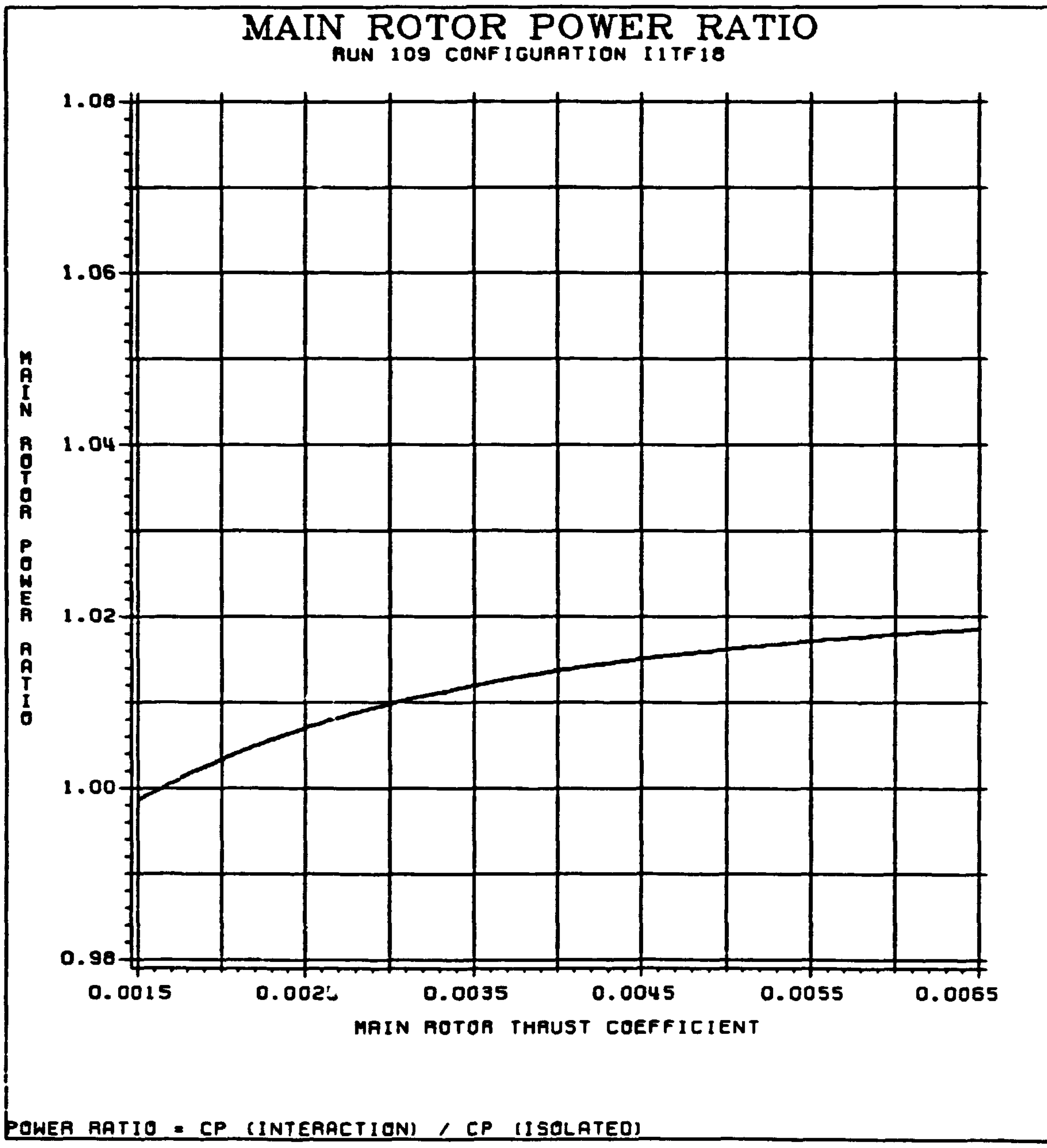
ORIGINAL PAGE IS
OF POOR QUALITY




MAIN ROTOR POWER RATIO
RUN 108 CONFIGURATION I20TF18
MAIN ROTOR POWER RATIO
1.08
1.06
1.04
1.02
1.00
0.98
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

ORIGINAL PAGE IS
OF POOR QUALITY




MAIN ROTOR POWER RATIO
RUN 109 CONFIGURATION I1TF18
1.08
1.06
1.04
1.02
1.00
0.98
MAIN ROTOR POWER RATIO
0.0015
0.0025
0.0035
0.0045
0.0055
0.0065
MAIN ROTOR THRUST COEFFICIENT
POWER RATIO = CP (INTERACTION) / CP (ISOLATED)

APPENDIX D

ACOUSTIC ANALYSIS OF ISOLATED ROTOR BASELINE

This appendix examines the isolated main rotor and tail rotor baselines and discusses the effects of the physical environment on the results. Particular items of interest are the effects of the presence of the vertical fin and the effects of the test building on noise, both of which can change the amplitude and distribution of acoustic energy generated by the rotors.

Isolated Main Rotor

Figure D-1 shows the effects of thrust variation on isolated main rotor noise. An increase in noise with thrust of approximately 5 dB over the thrust range 300 to 1000 newtons is seen in all three indicators (DBA, fundamental harmonic, and the broadband peak). The increase in noise level with thrust is reasonably linear, since the rotor was always operating below stall. Figures E-3 through E-7 (Appendix E) contain the data plots for the isolated main rotor thrust sweep at microphone 4.

Under ideal conditions, the same noise level will be produced in the plane of the rotor at all azimuths. A check of the test rotor is shown in figure D-2. This shows the DBA and broadband peak levels to be relatively uniform, although the fundamental harmonic has slightly more scatter. This scatter is believed due to reverberation effects of the whirl cage enclosure. Figures E-8 through E-12 (Appendix F) show data for a constant thrust level for microphones 1, 2, 3, 5, and 6.

Since all tests were run at constant tipspeed and the ambient temperature varied significantly during the test, the tip mach number also varied. This initially caused concern when comparing data from different days. However, Figure D-3 shows that the variation appeared to have minimal effect on the noise. The DBA level increased approximately 0.7 dB between the hottest day and the coldest day. The fundamental harmonic varied up to 2.6 dB; however, it is of lesser significance at scaled frequencies. Significant changes were not expected in the hover condition, since the highest tip Mach number achieved of 0.66 was below the delocalization Mach number for the FX-083 airfoil.

The isolated main rotor cases were run with the non-rotating tail rotor and the fin in place. This appeared to have no effect on the majority of main rotor acoustic data. One exception occurred when the tail rotor and fin were

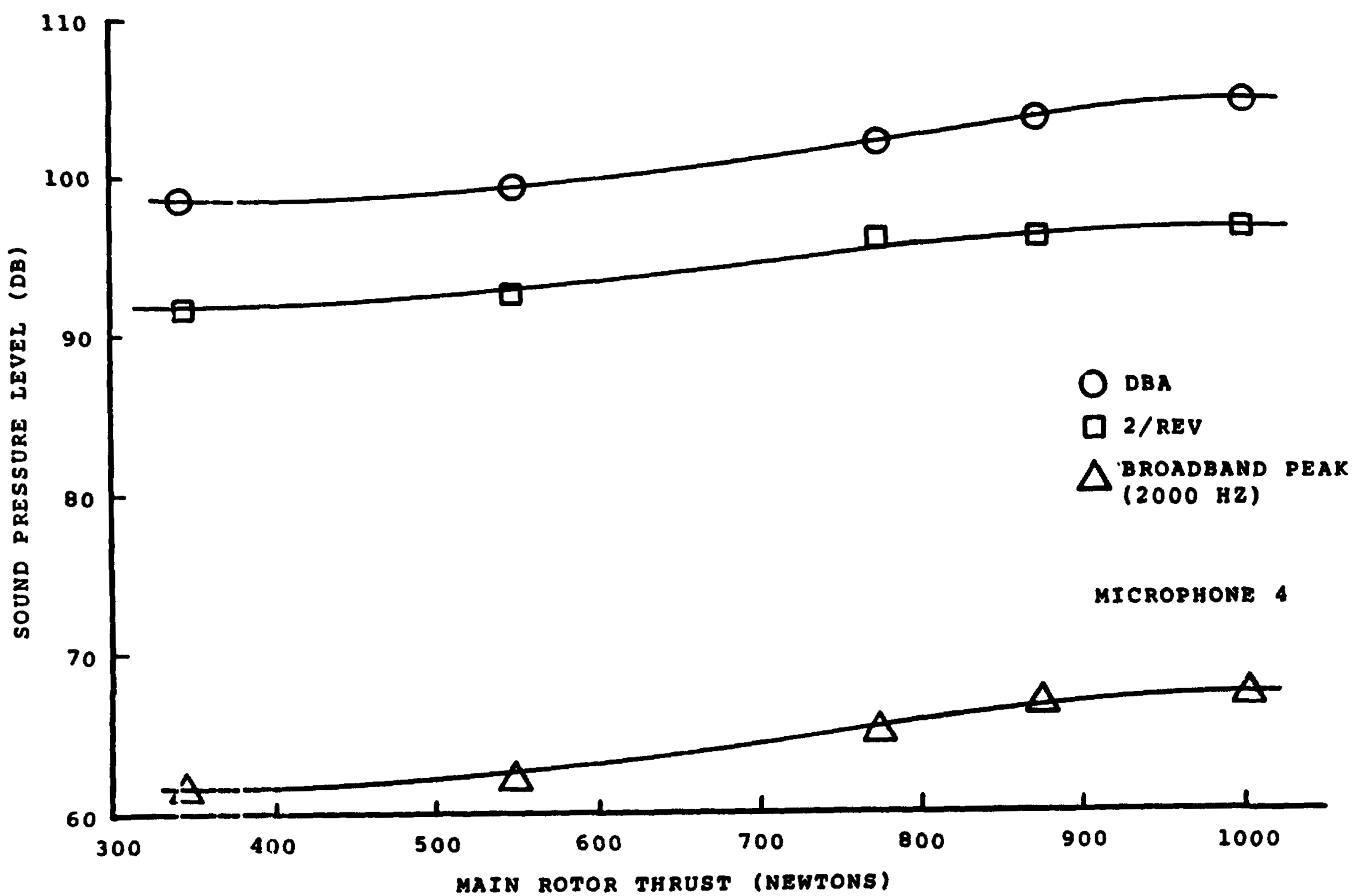


Figure D-1. Thrust level effect on isolated main rotor noise.

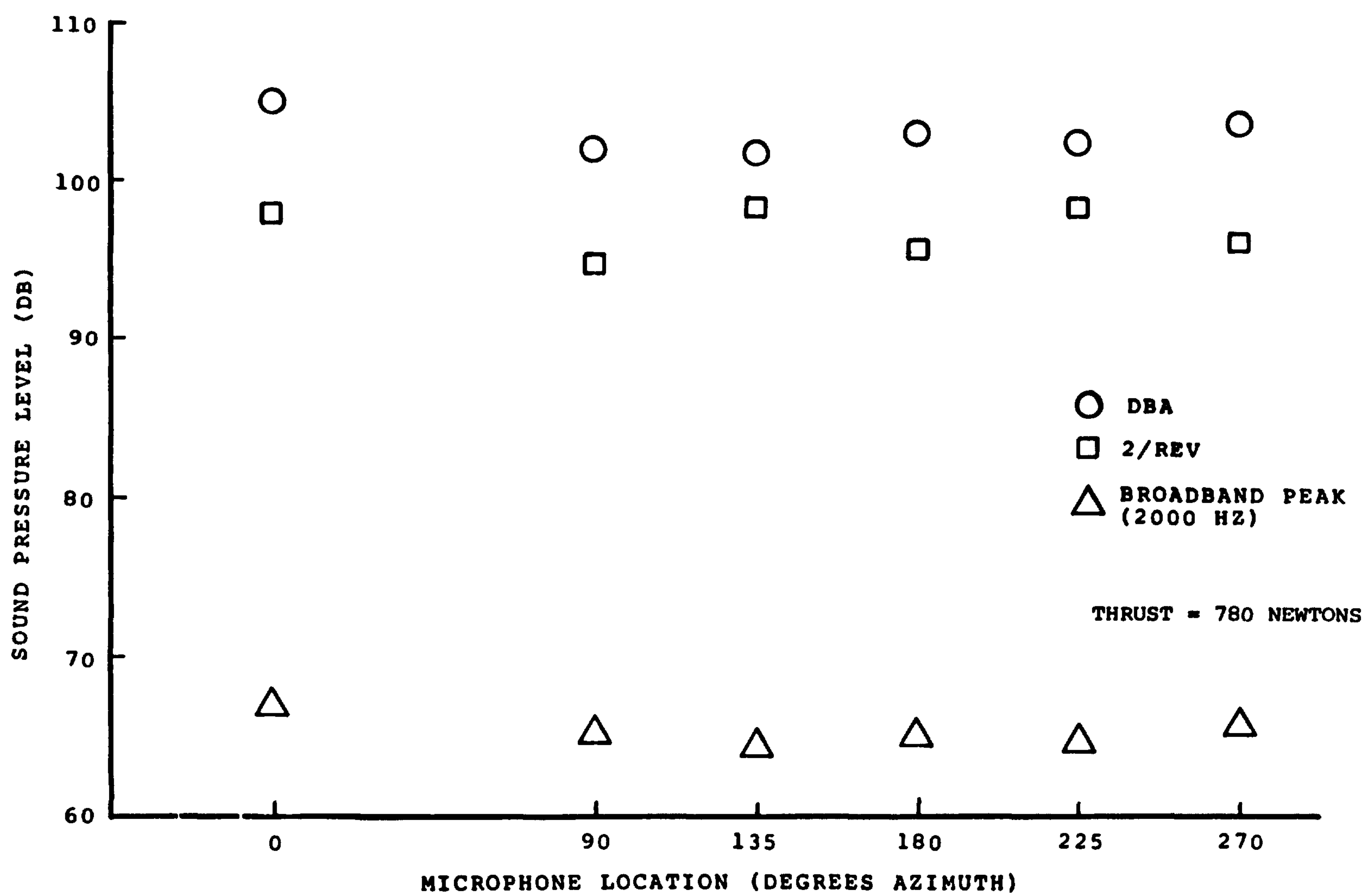


Figure D-2. Main rotor noise directivity, isolated rotor.

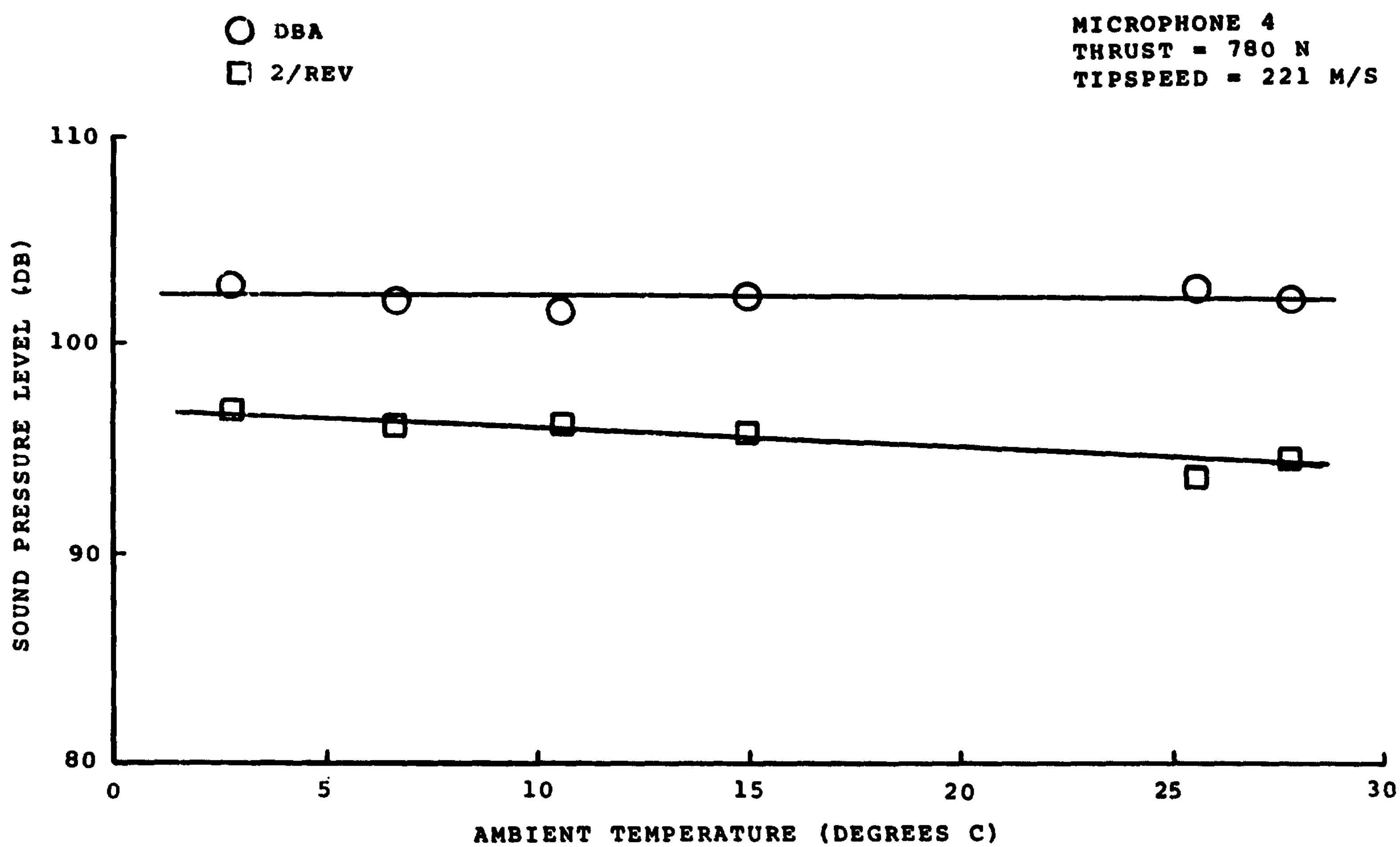


Figure D-3. Temperature effect on isolated main rotor noise.

located at grid point 1 in the pusher configuration. At this location, both the main rotor fundamental harmonic and the broadband component increased 2-5 dB for all thrust levels while the higher harmonics are relatively unaffected. This increase is believed to have been caused by the close proximity of the fin to the main rotor tip.

Isolated Tail Rotor

The isolated tail rotor cases included both pusher and tractor configurations and test for the effects of fin blockage. Fin effect tests included the baseline fin-off and fin-installed runs with both 18% and 39% blockage. A canted fin run was also made to simulate a canted tail rotor.

Figure D-4 summarizes the effects of thrust on isolated tail rotor harmonic noise, with and without a fin. Because of the large data scatter, a logarithmic average of the first four harmonics (2, 4, 6 and 8/rev) has been plotted. Harmonics above 8/rev quickly drop off in amplitude and so do not contribute significantly to the total energy. This plot shows a moderate increase in noise with thrust level, an average increase of 8 dB over the entire thrust range, which is similar to that for the main rotor.

The presence of a fin increase tail rotor noise by 4 to 5 dB. This is mainly due to a large increase in the amplitude of the 4/rev component when the fin is added. An examination of test data showed that in the case with no fin, the 2/rev component either dominates the spectrum or is equal in amplitude to the 4/rev component. In the cases with fin blockage, most of the harmonics match the no-fin cases. The 4/rev harmonic, though increases approximately 8-10 dB.

The test data also showed no discernible effects between different fin blockages, nor any effect due to canting the fin relative to the tail rotor.

Figure D-5 summarizes the thrust level effect on isolated tail rotor broadband noise. Here a dramatic change appears when the tail rotor enters stall at approximately 45 newtons of thrust. Above stall, broadband noise increases at a rate of approximately 1.2 dB per newton of thrust, compared to approximately 0.1 dB per newton of thrust below stall. Mixed results are seen for the no-fin and fin-on cases. Below stall, the trend is similar to that of the tail rotor harmonic noise, where fin blockage increased noise by 4dB above the no-fin case. Fin blockage in the pusher mode continues this trend above stall. However, the run in tractor mode stays significantly below the other runs by as much as 8dB. Figures E-13 through E-20 (appendix E) show an

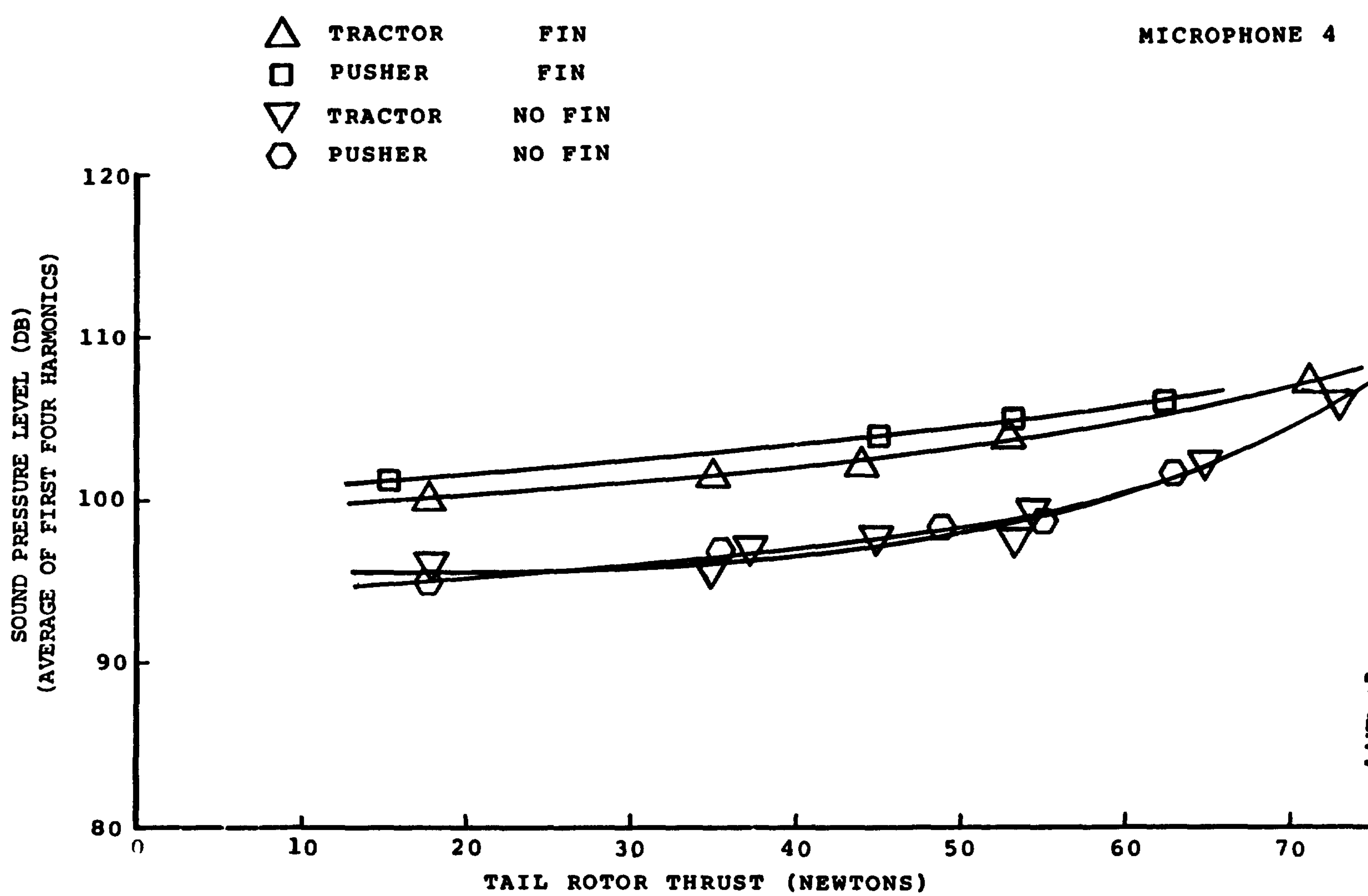


Figure D-4. Thrust level effect on isolated tail rotor harmonic noise.

ORIGINAL PAGE IS
OF POOR QUALITY

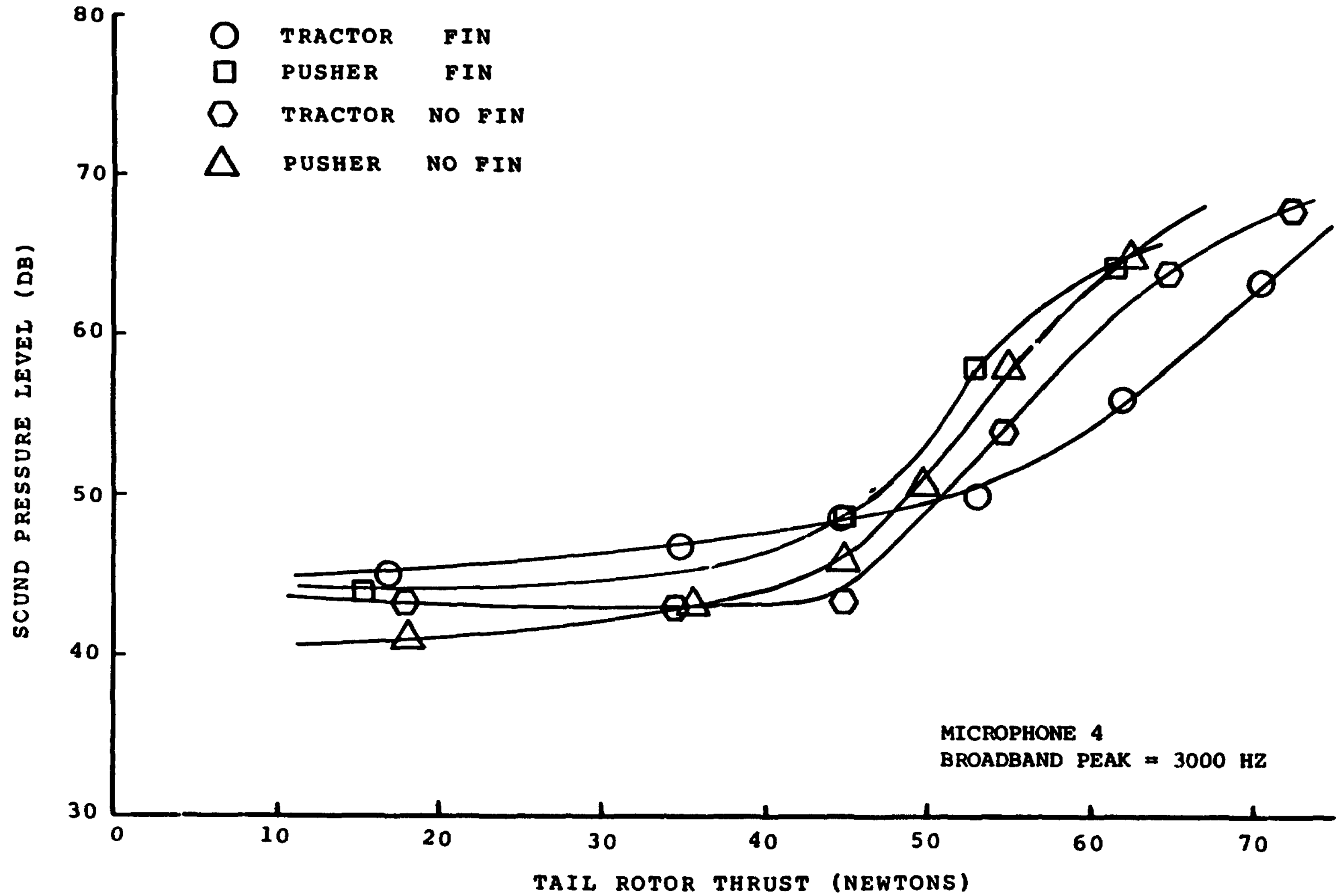


Figure D-5. Thrust level effect on isolated tail rotor peak broadband noise.

example isolated tail rotor thrust sweep for the tractor configuration with fin installed for microphone 4.

The directivity of isolated tail rotor is shown in Figure D-6. There is a slight increase of 2-3 dB in the harmonic noise at the 135 degree (microphone 3) and the 225 degree (microphone 5) locations. The increase in noise at the 0 degree (microphone 1) location is probably due to the effect of the whirl cage, as was the main rotor noise level at this location. The effect of the fin adding 2 to 4 dB to the lower harmonics is generally true at all locations, except for the 270 degree location. The presence of the fin appeared to have no effect on broadband noise at this thrust level (62 newtons). Figures E-21 through E-25 (appendix E) show data for the same thrust level for microphones 1, 2, 3, 5 and 6 for the tail rotor.

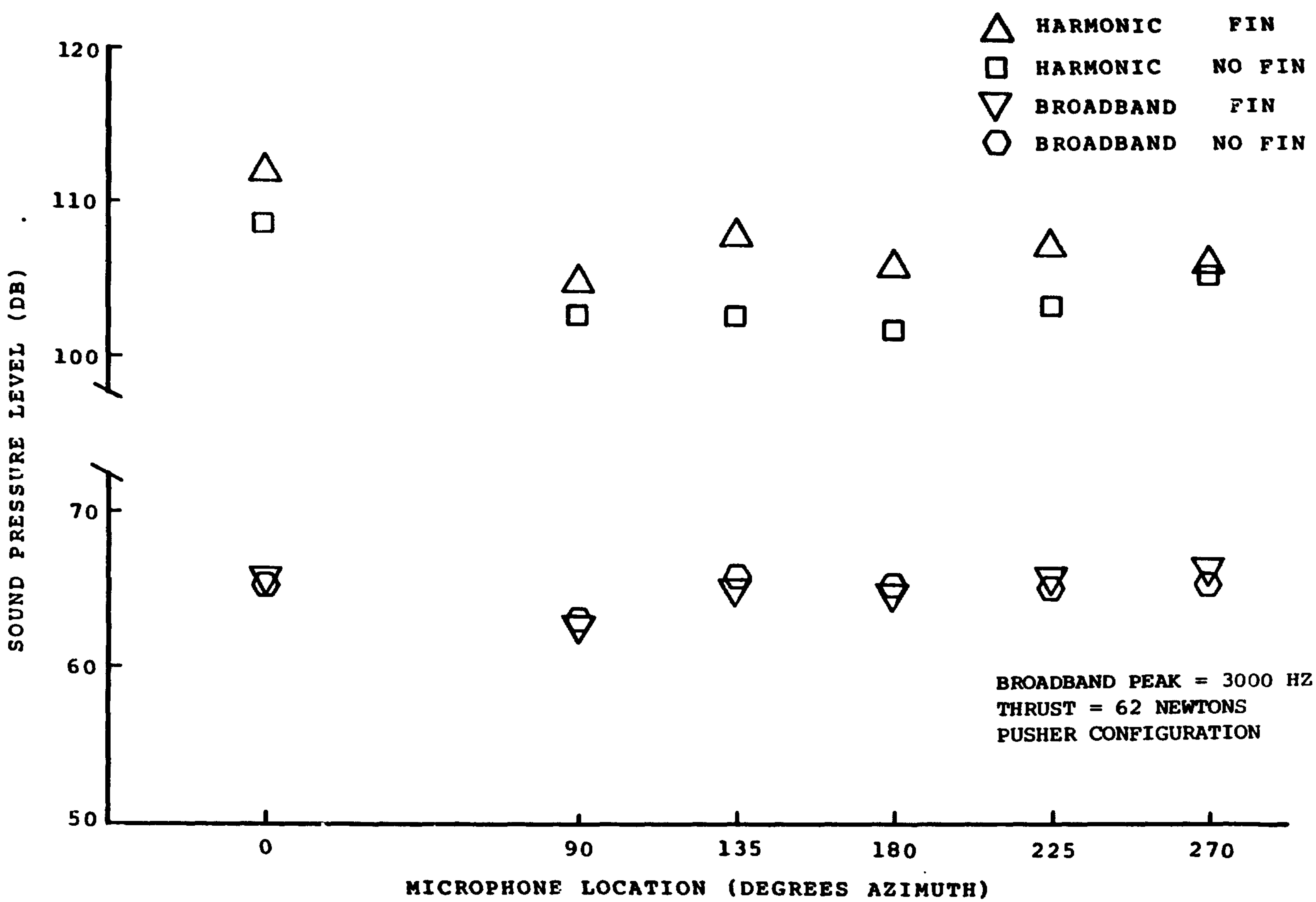


Figure D-6. Tail rotor noise directivity, isolated rotor.

APPENDIX E

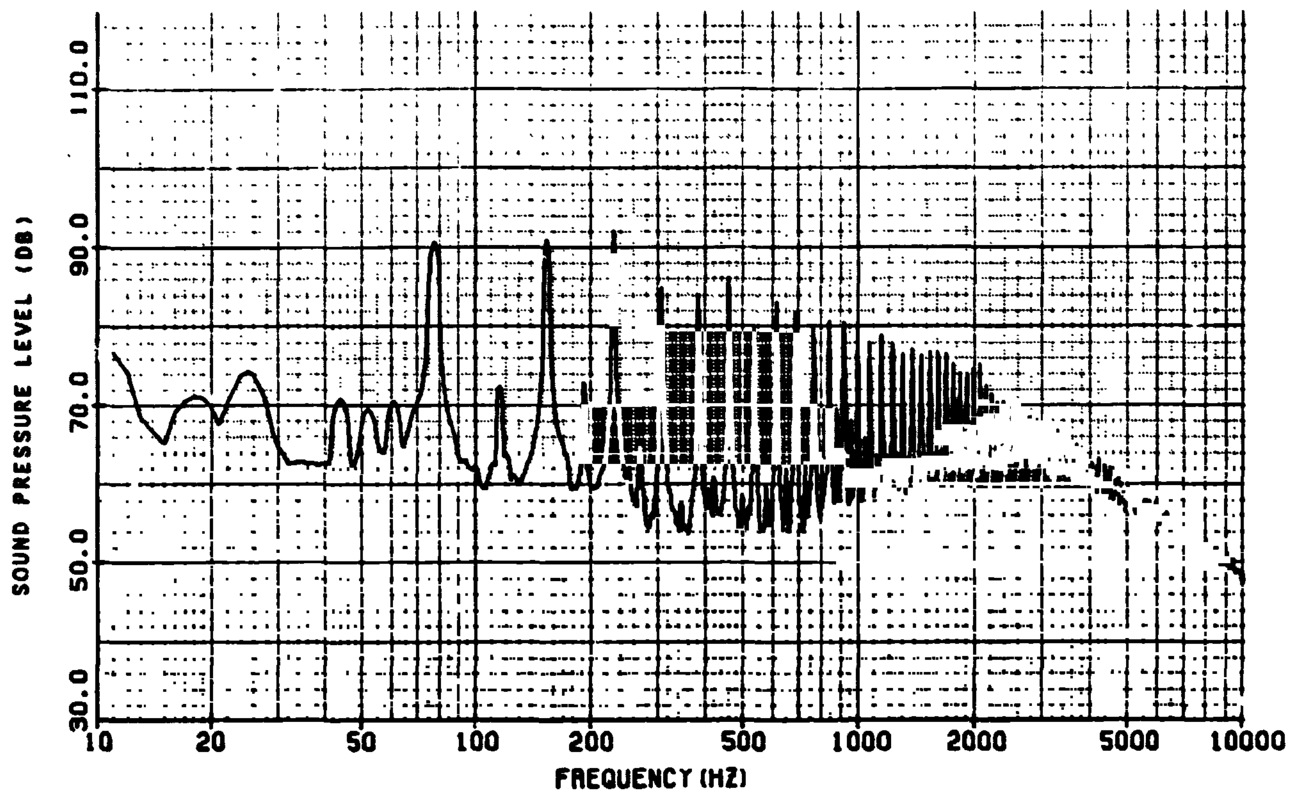
ACOUSTICS PLOTS

Narrowband acoustics analyses of noise generated by the model are presented in graphical form in this appendix. Plots are presented for selected test runs as shown in Table E-I. Time history plots are included for the single rotor cases. In most cases, results are plotted for various rotor thrust levels at a given azimuth (i.e., microphone 4 shown in Figure A-5) along with results for various azimuths at a given rotor thrust or trim point. Microphone location numbers are described in Figure A-5. The test run configuration code is explained in Figure A-9 and tail rotor locations are shown in Figure A-10.

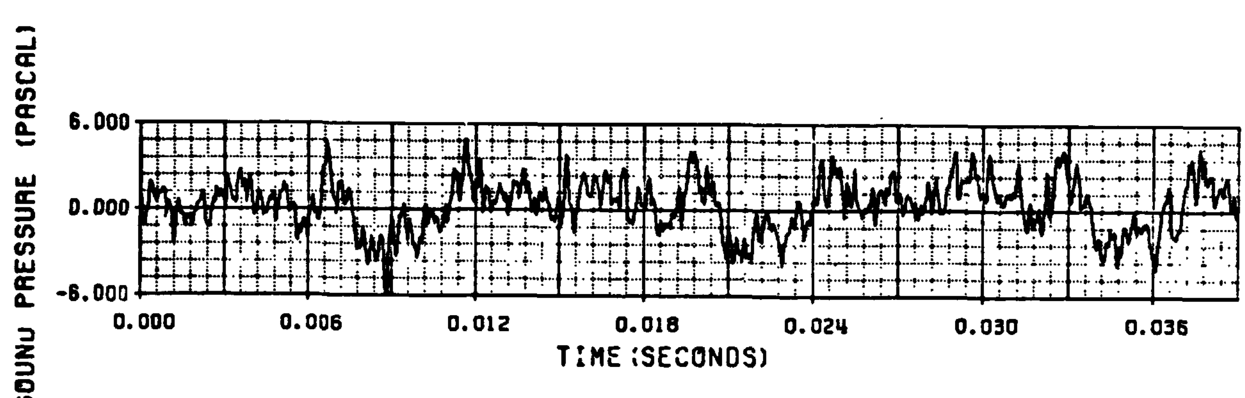
TABLE E-I. SUMMARY OF ACOUSTICS PLOTS

OPERATING MODE	TEST RUN NUMBER	CONFIGURATION (See Fig. A-9)	PAGE
Isolated Main Rotor	084	I2PF18	E-3 thru E-12
Tail rotor/fin	094	T16TF39	E-13 thru E-25
Main rotor/tail rotor/fin	074	I1PF18	E-26 thru E-33
Main rotor/tail rotor/fin	109	I1TF18	E-34 thru E-43
Main rotor/tail rotor/fin	076	I14PF18	E-44 thru E-47
Main rotor/tail rotor/fin	106	I14TF18	E-48 thru E-51
Main rotor/tail rotor/fin	084	I2PF18	E-52 thru E-55
Main rotor/tail rotor/fin	079	I17PF18	E-56
Main rotor/tail rotor/fin	081	I17PF39	E-57
Main rotor/tail rotor/fin	104	I17TF18	E-58
Main rotor/tail rotor/fin	055	I3PF39	E-59 thru E-62
Main rotor/tail rotor/fin	097	I3TF39	E-63 thru E-66
Main rotor/tail rotor/fin	099	I18TF39	E-67
Main rotor/tail rotor/fin	067	I4PF39	E-68 thru E-76
Main rotor/tail rotor/fin	100	I4TF39	E-77 thru E-80
Main rotor/tail rotor/fin	042	I5PF18	E-81
Main rotor/tail rotor/fin	096	I7TF39	E-82 thru E-84
Main rotor/tail rotor/fin	064	I8PF39	E-85 thru E-88
Main rotor/tail rotor/fin	101	I8TF39	E-89 thru E-93
Main rotor/tail rotor/fin	040	I9PF18	E-94

ORIGINAL PAGE IS
OF POOR QUALITY



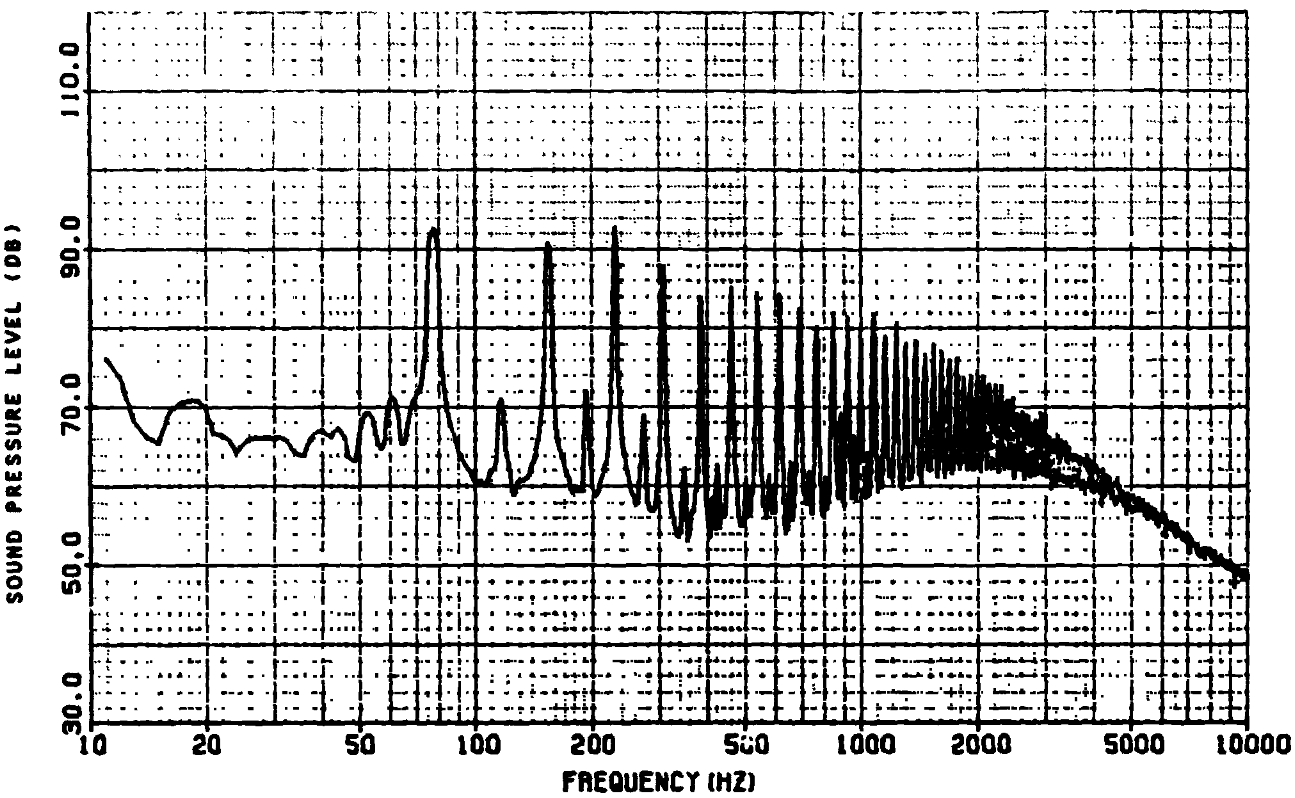
a) Narrowband Analysis



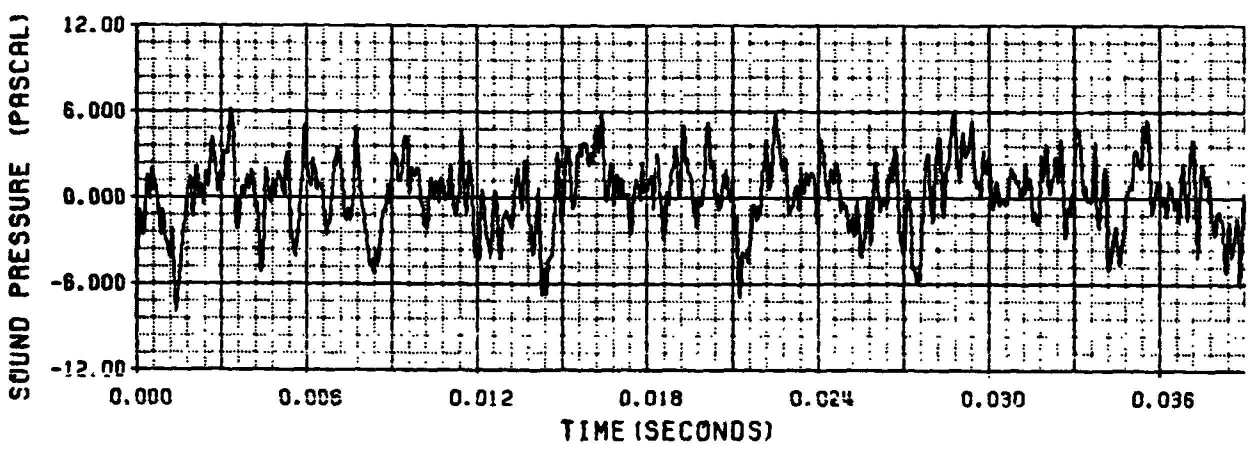
b) Time History

RUN 84 CONF I2PF18 MR THRUST 341 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY



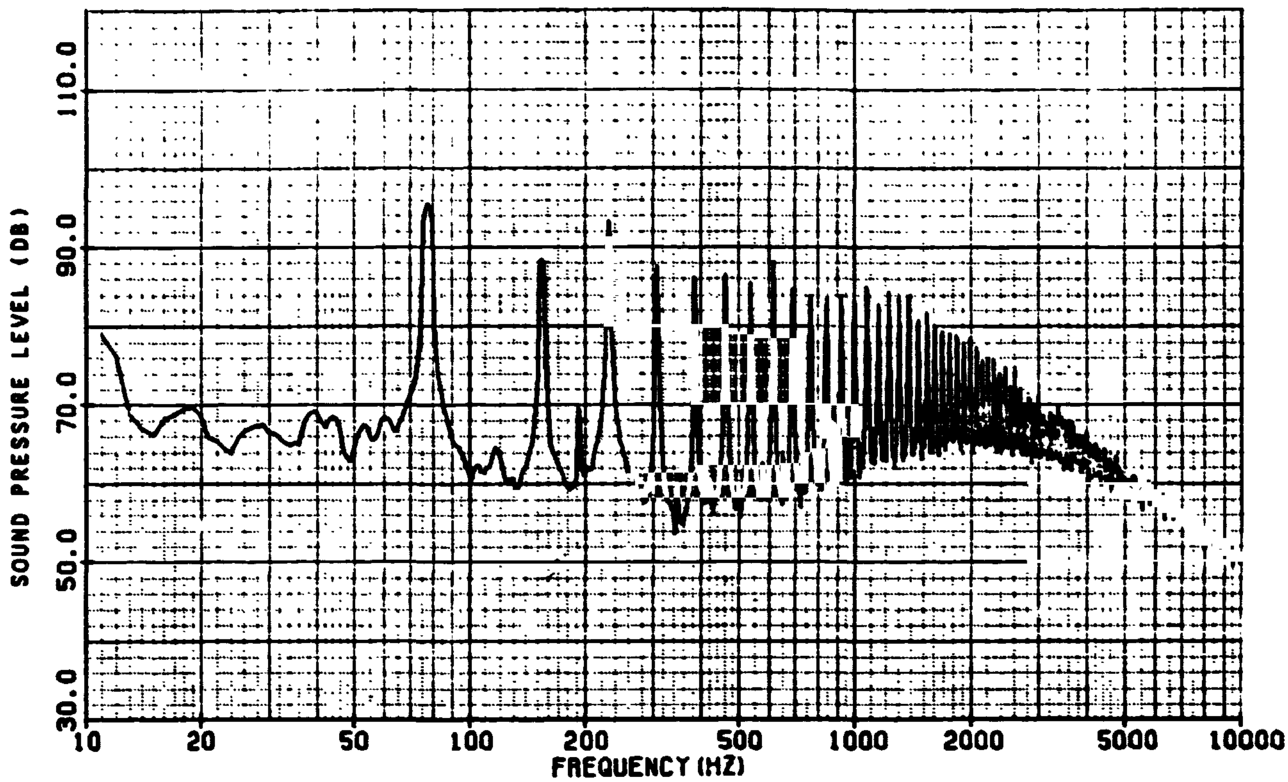
a) Narrowband Analysis



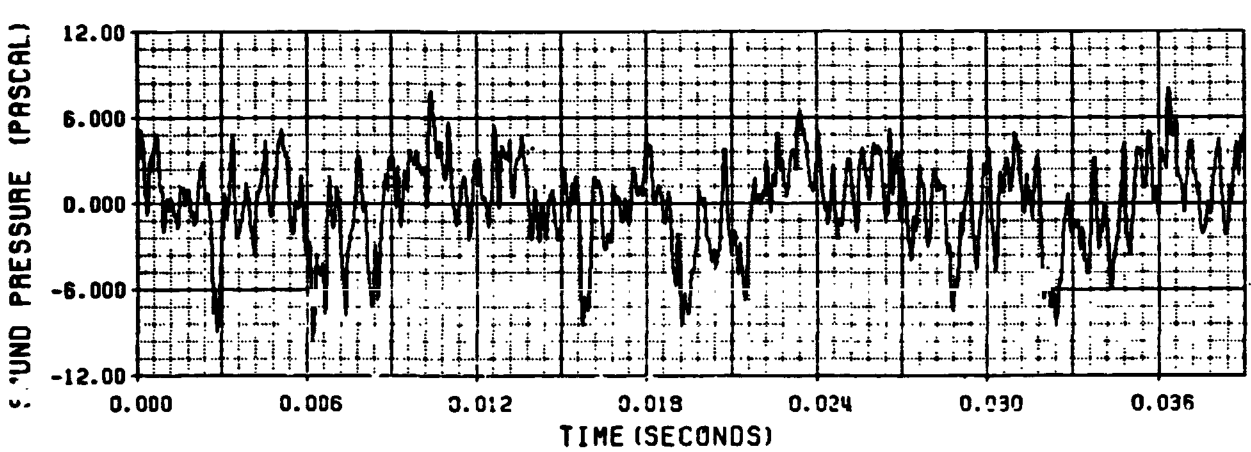
b) Time History

RUN 84 CONF 12PF18 MR THRUST 551 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY



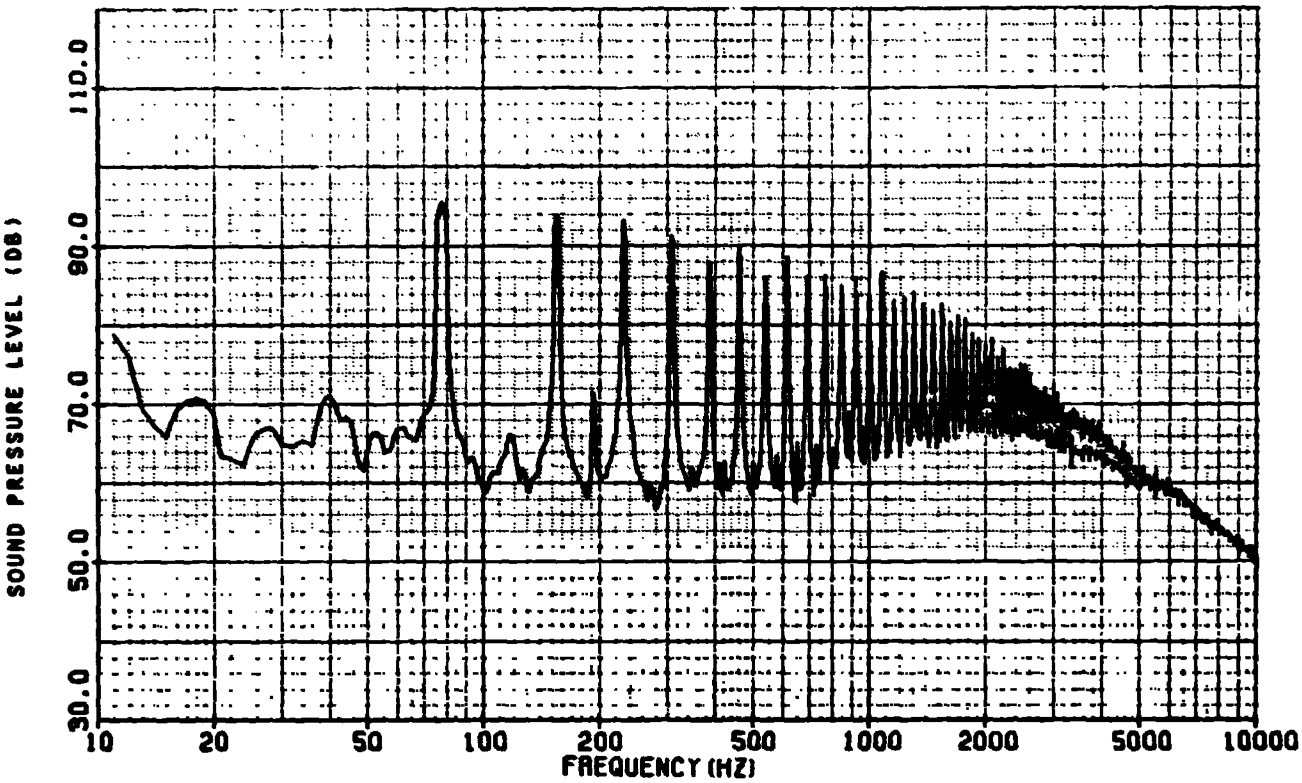
a) Narrowband Analysis



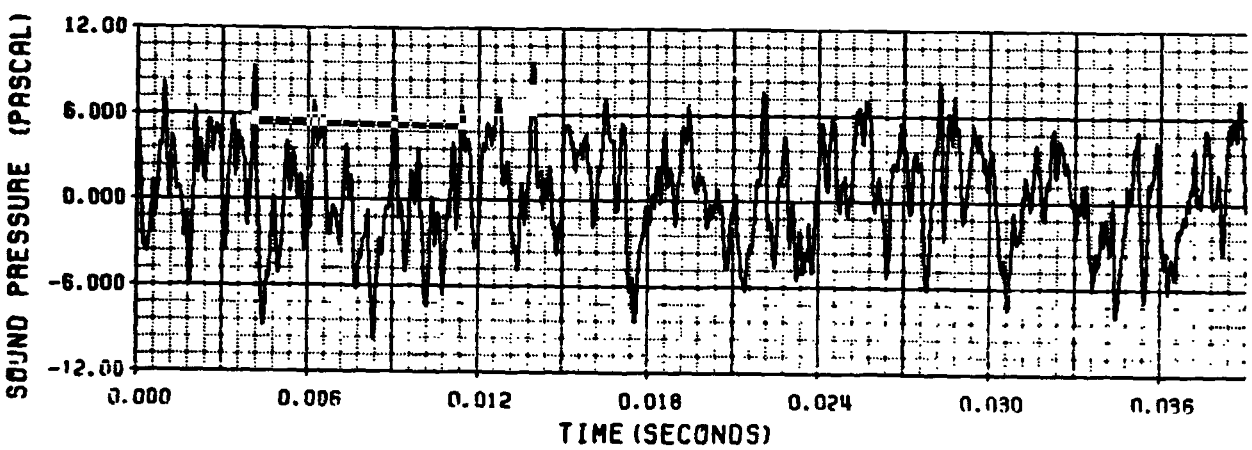
b) Time History

RUN 84 CONF I2PF18 MR THRUST 780 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY



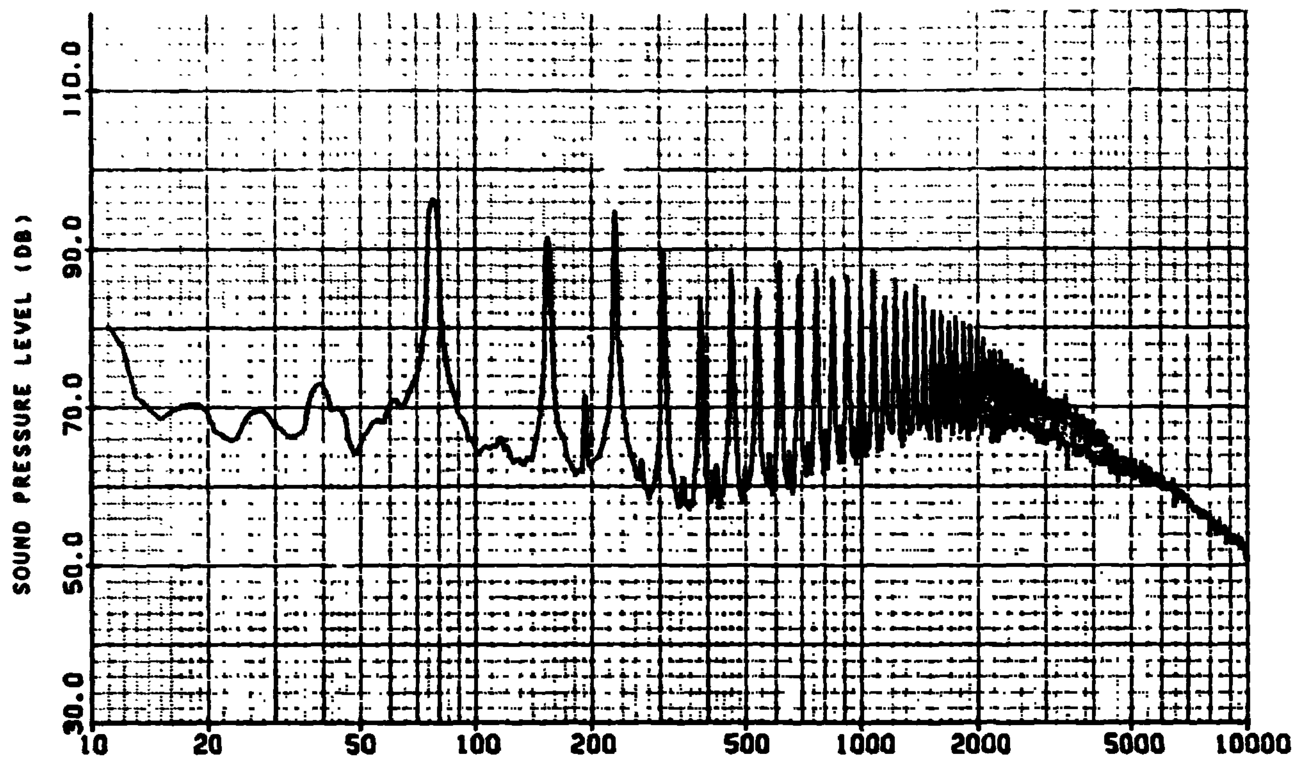
a) Narrowband Analysis



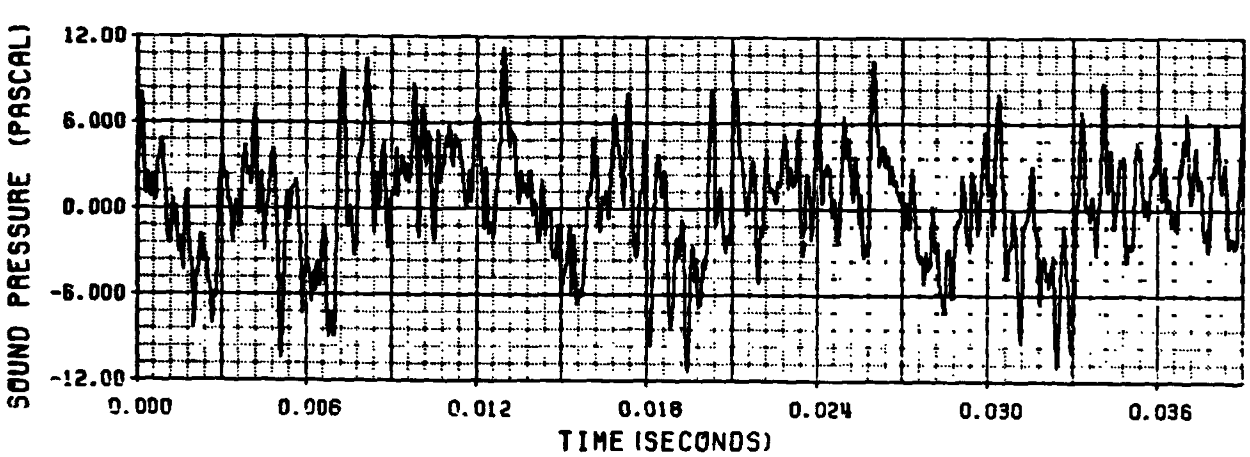
b) Time History

RUN 84 CONF 12PF18 NR THRUST 869 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY



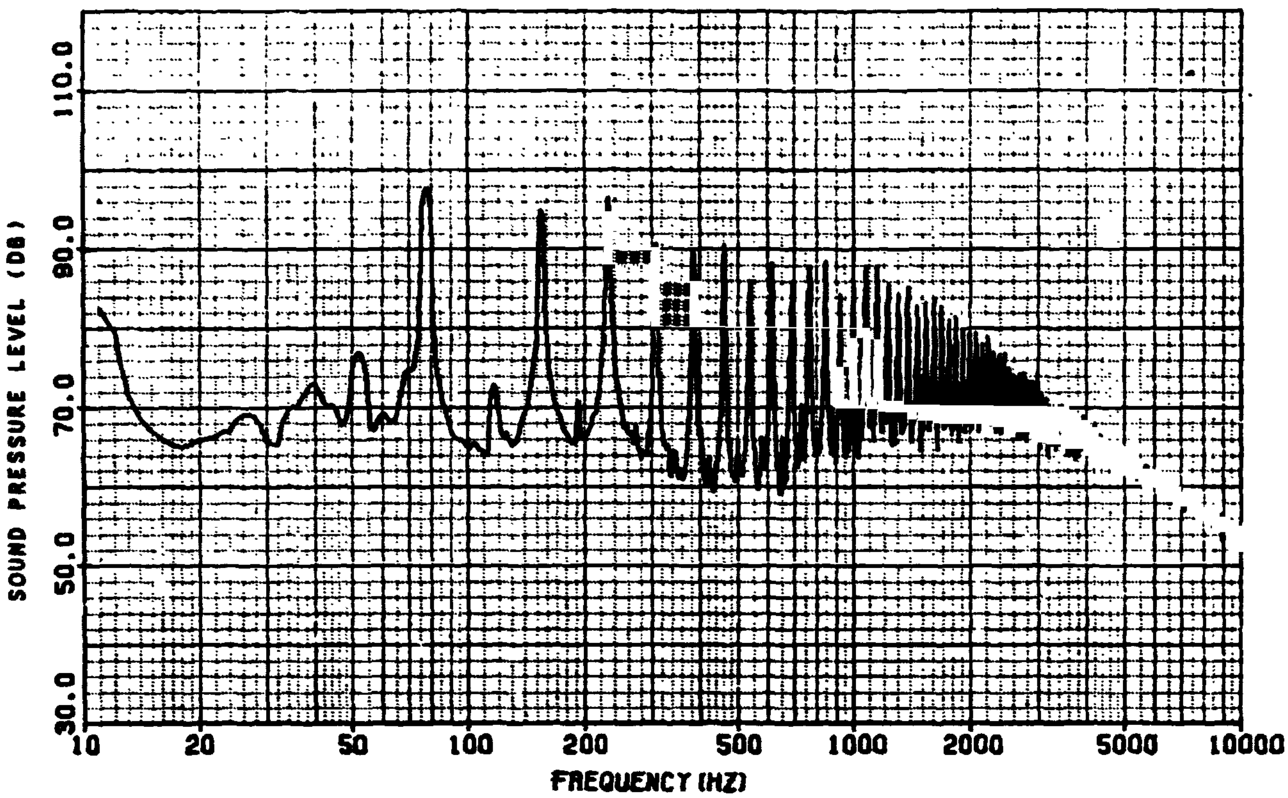
a) Narrowband Analysis



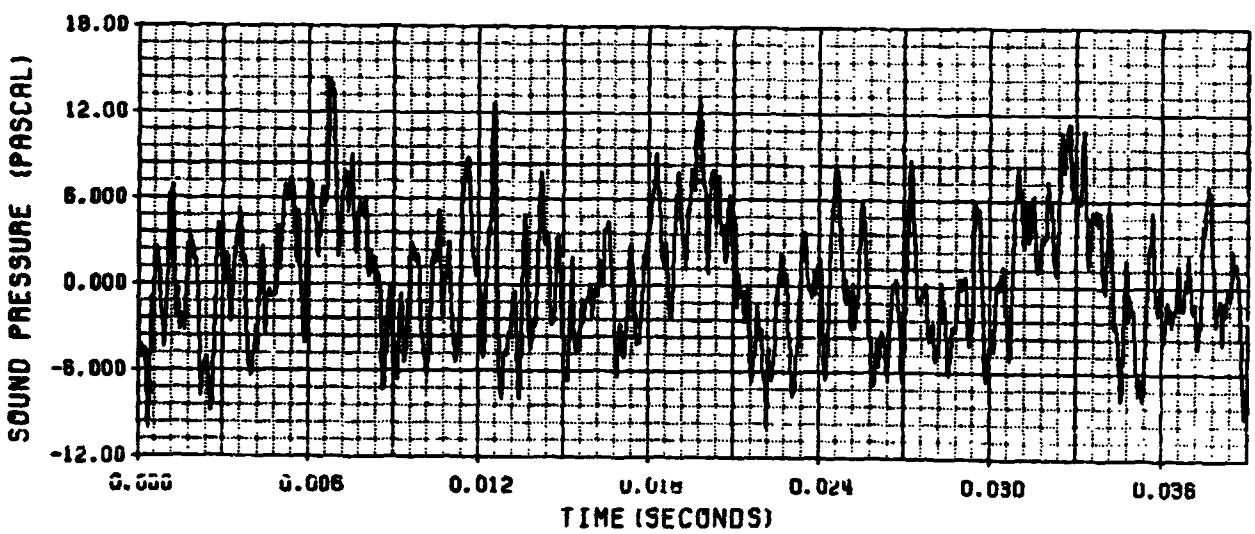
b) Time History

RUN 84 CONF I2PF18 MR THRUST 1008 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY



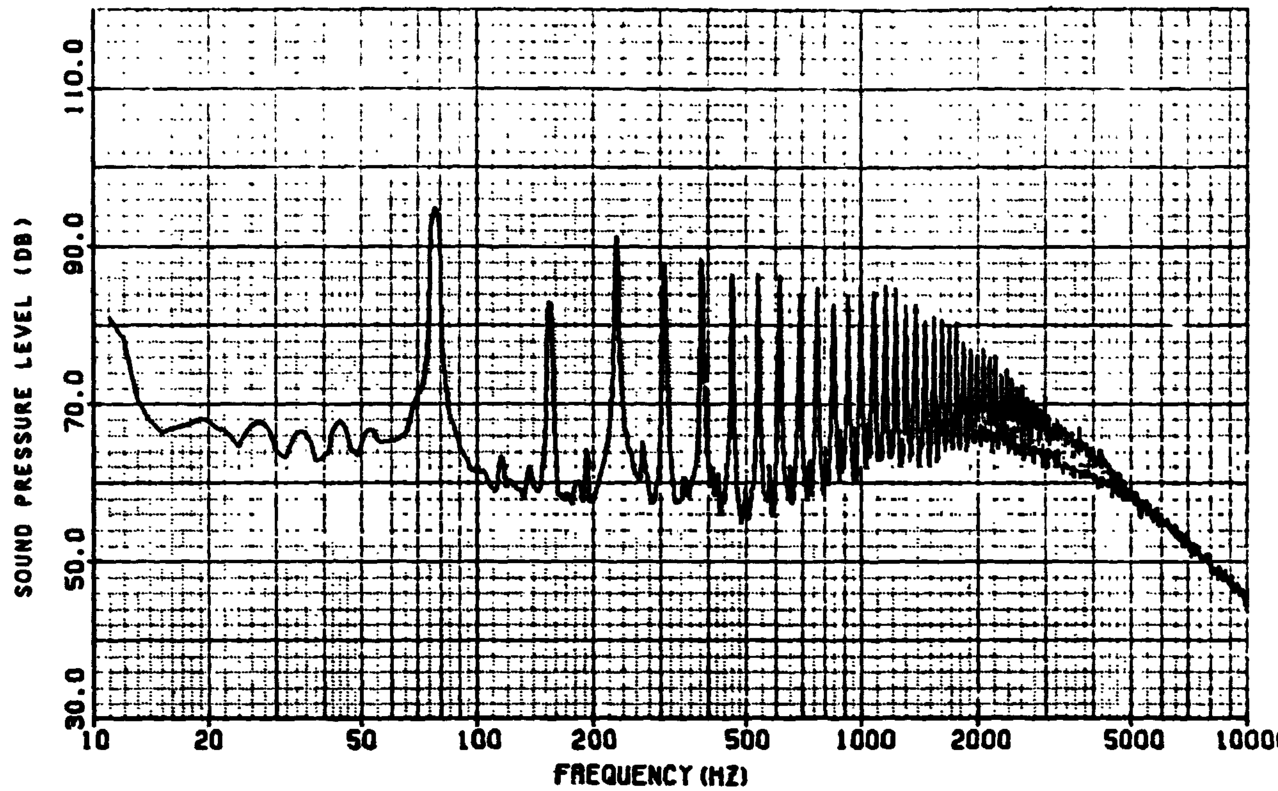
a) Narrowband Analysis



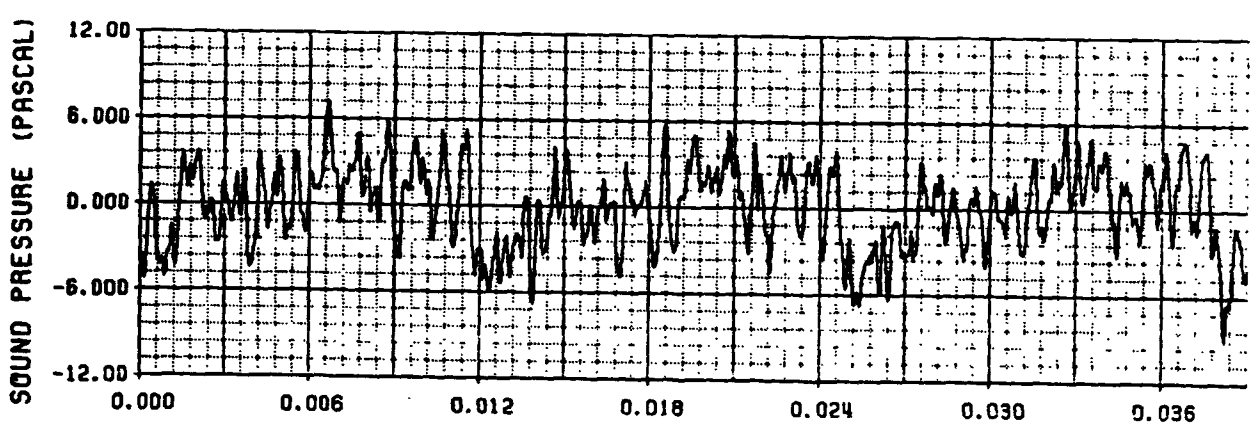
b) Time History

RUN 84 CONF 12PF18 MR THRUST 780 N MIKE 1

ORIGINAL PAGE IS
OF POOR QUALITY



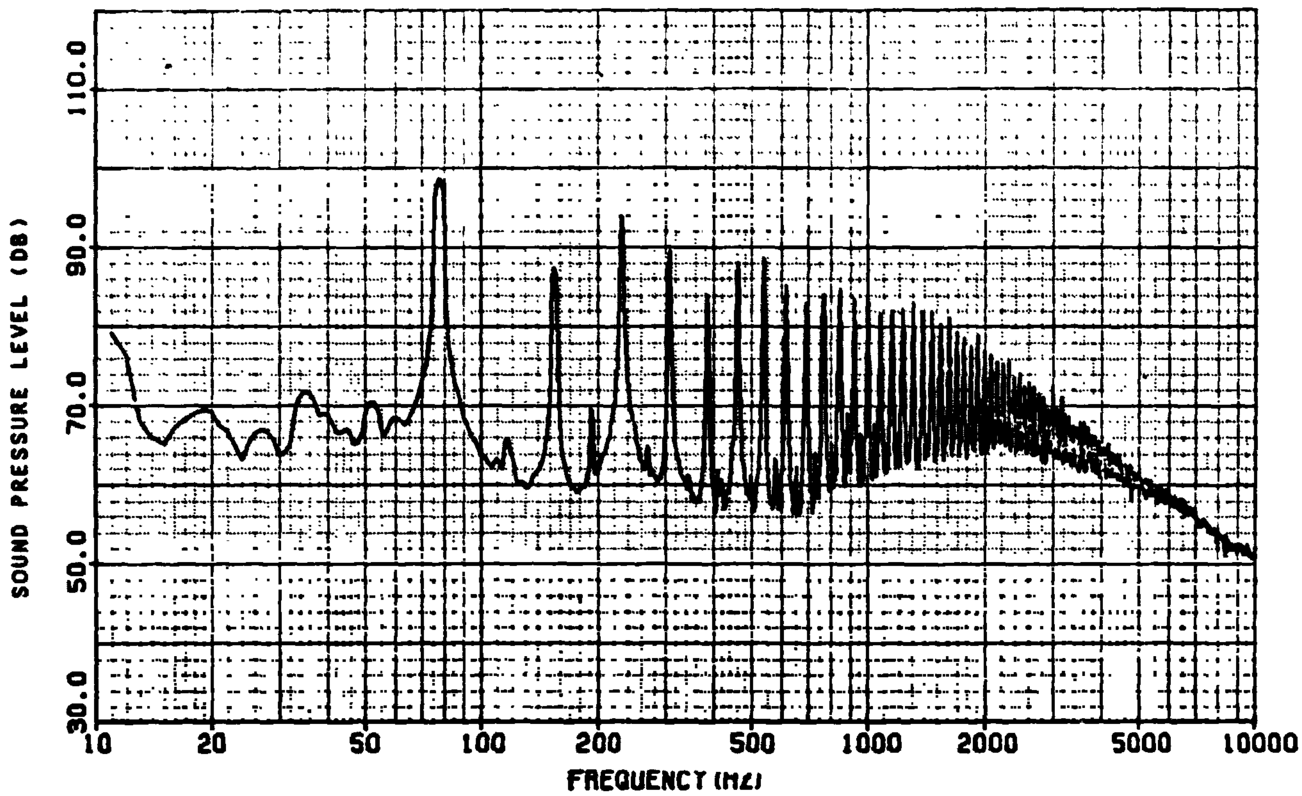
a) Narrowband Analysis



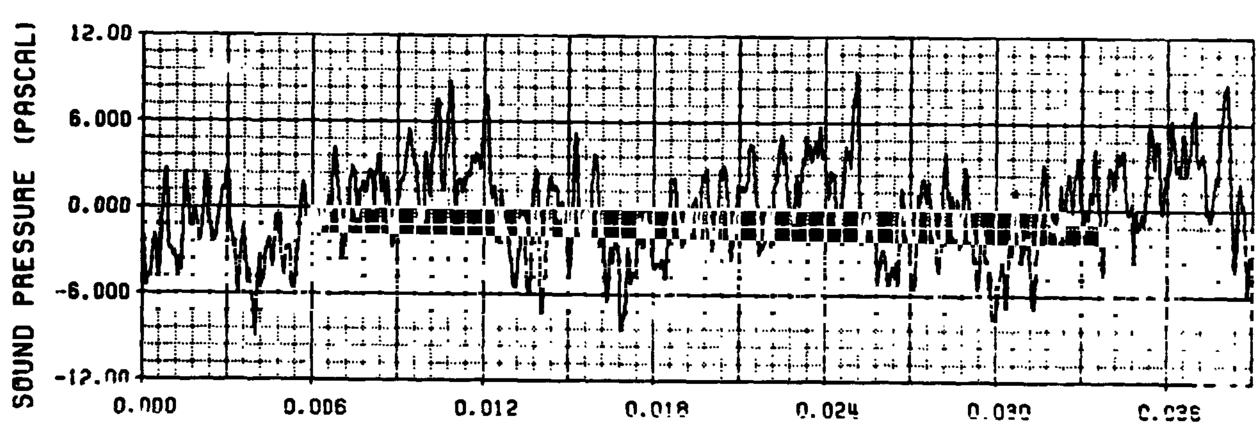
b) Time History

RUN 84 CONF I2PF18 MR THRUST 780 N MIKE 2

ORIGINAL PAGE IS
OF POOR QUALITY



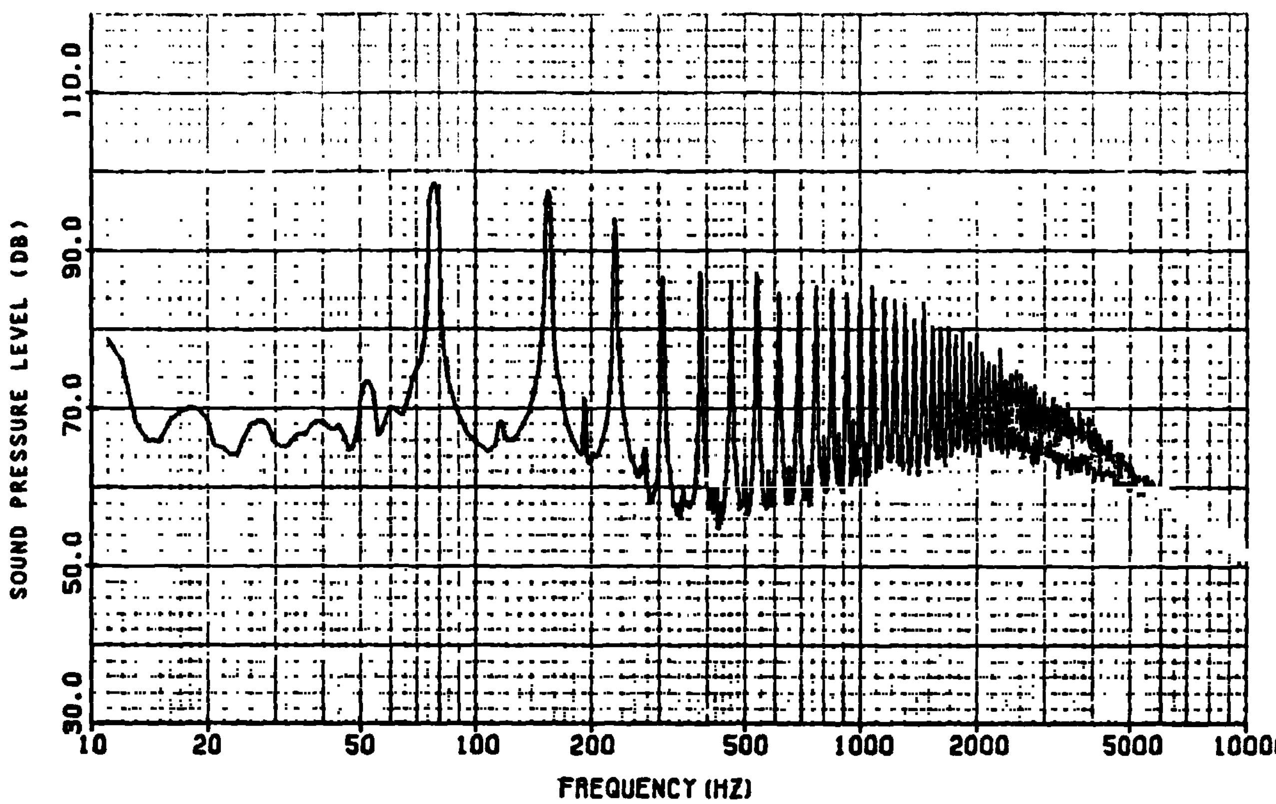
a) Narrowband Analysis



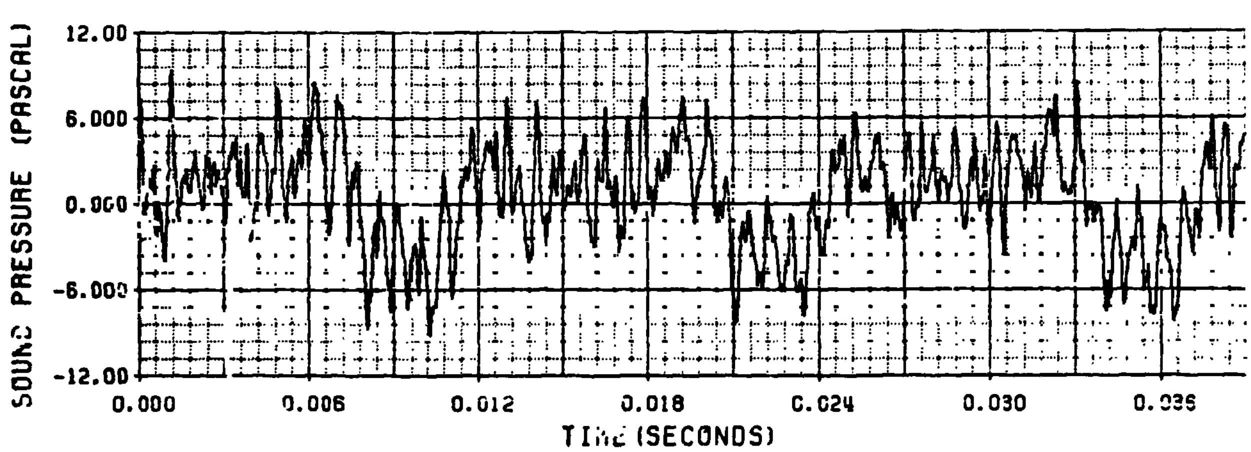
b) Time History

RUN 84 CONF 12PF18 MR THRUST 780 N MIKE 3

ORIGINAL PAGE IS
OF POOR QUALITY



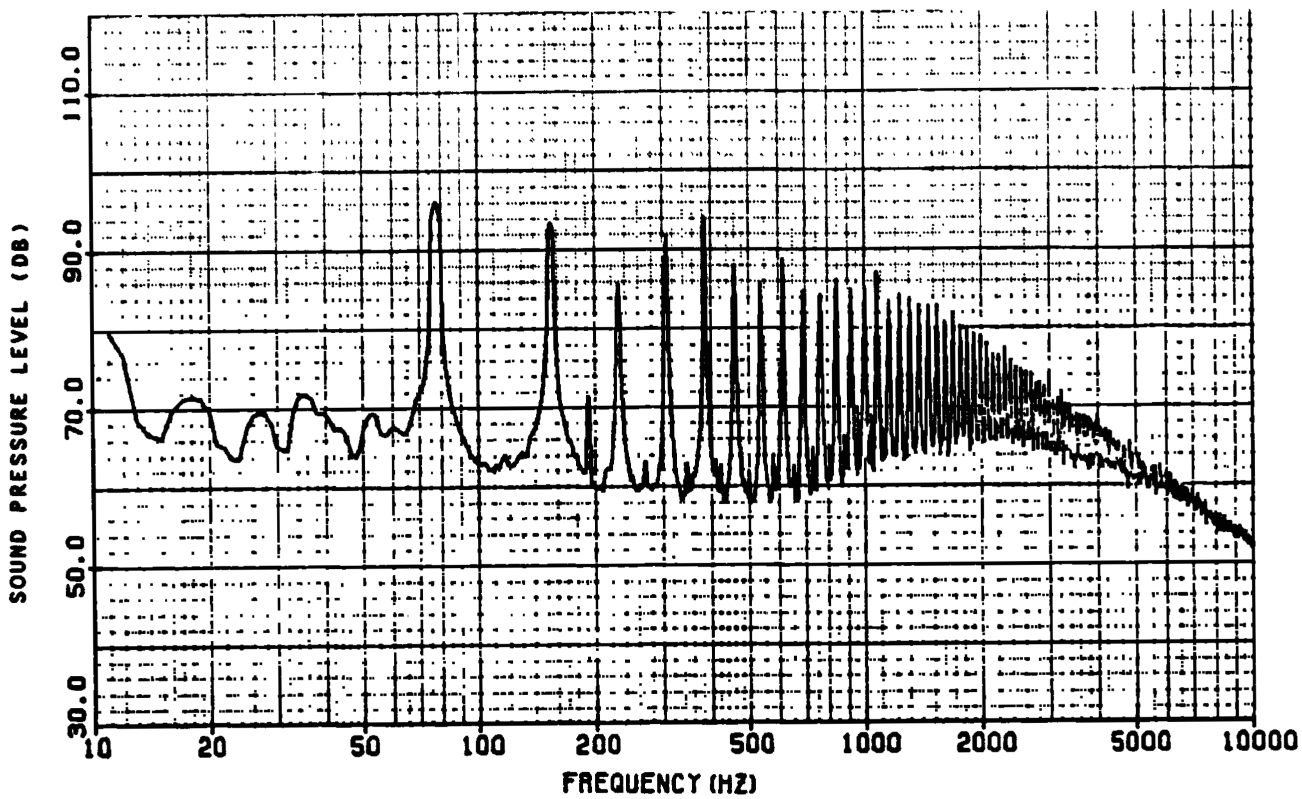
a) Narrowband Analysis



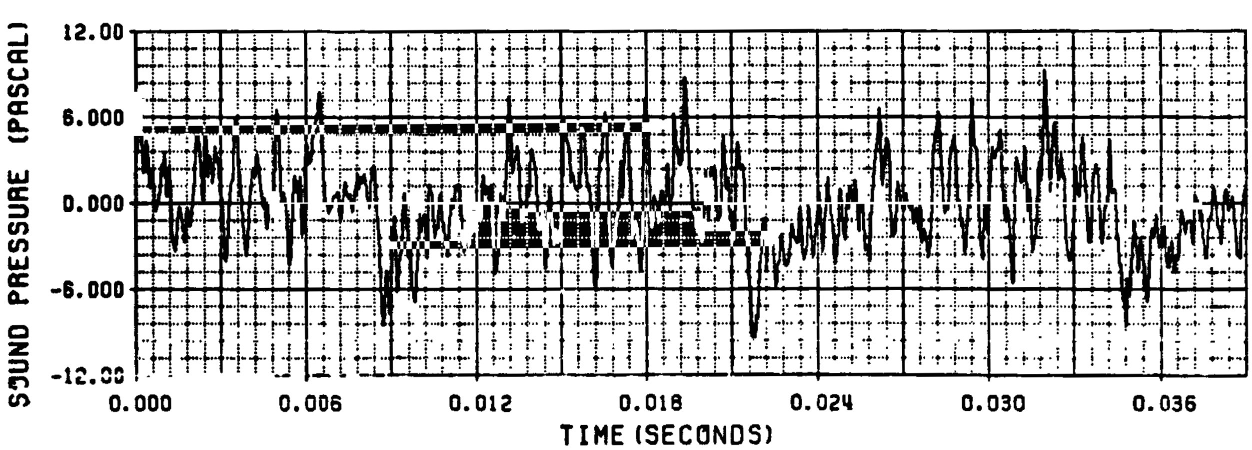
b) Time History

RUN 84 CONF I2PF18 MR THRUST 780 N MIKE 5

ORIGINAL PAGE IS
OF POOR QUALITY



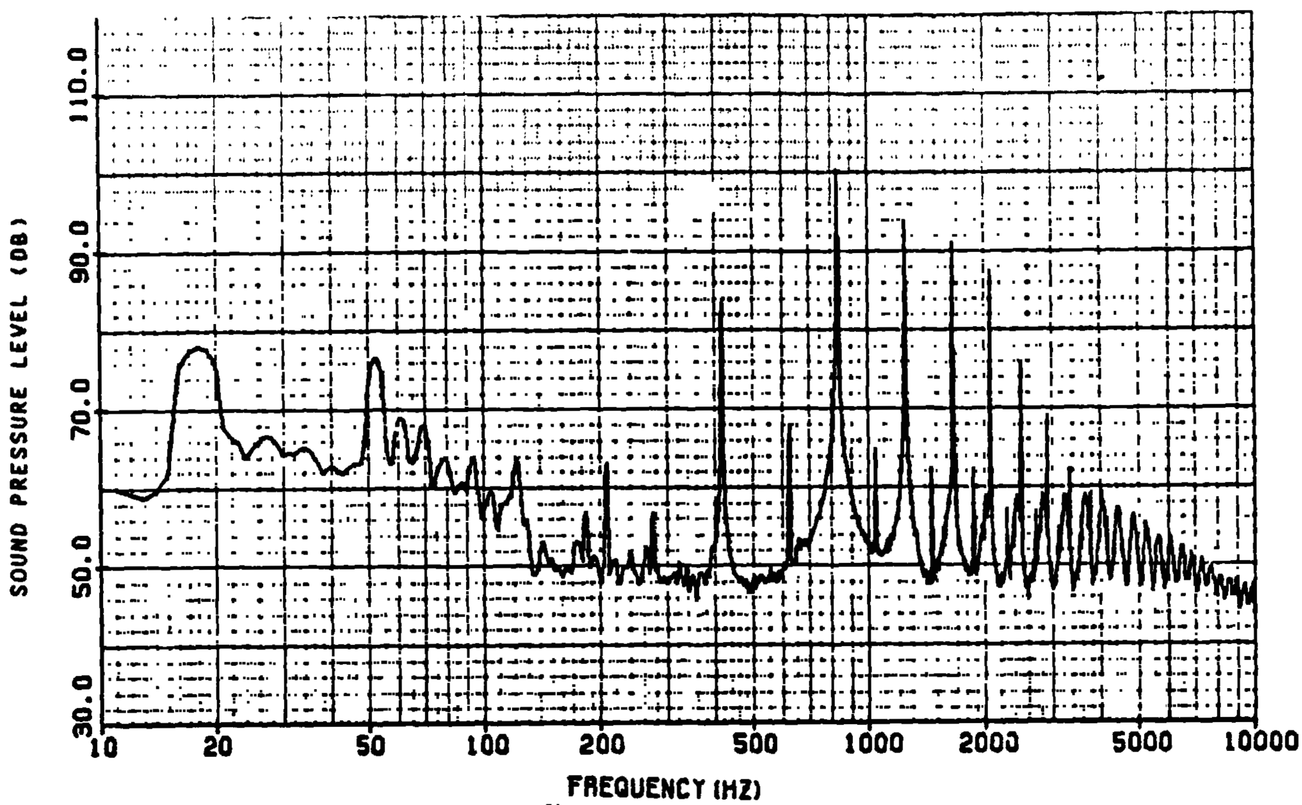
a) Narrowband Analysis



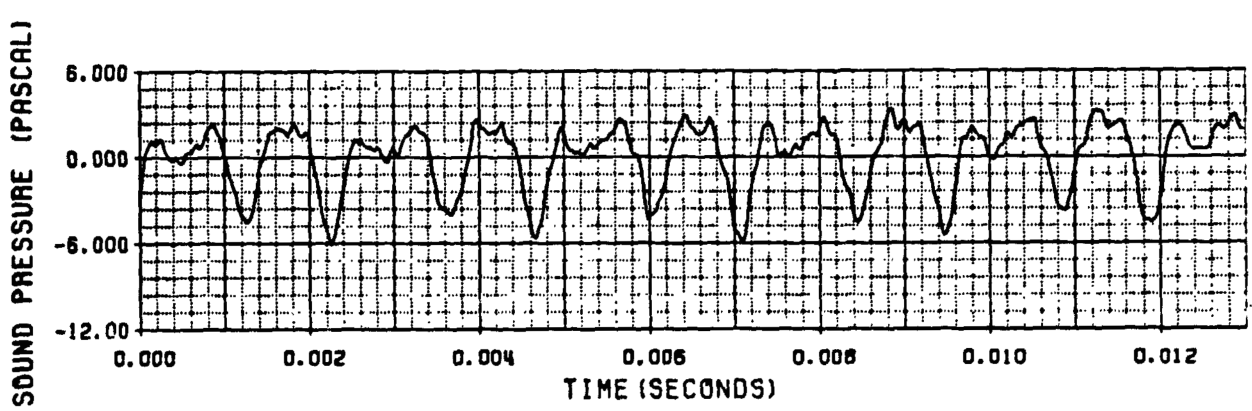
b) Time History

RUN 84 CONF I2PF18 MR THRUST 780 N MIKE 6

ORIGINAL PAGE IS
OF POOR QUALITY



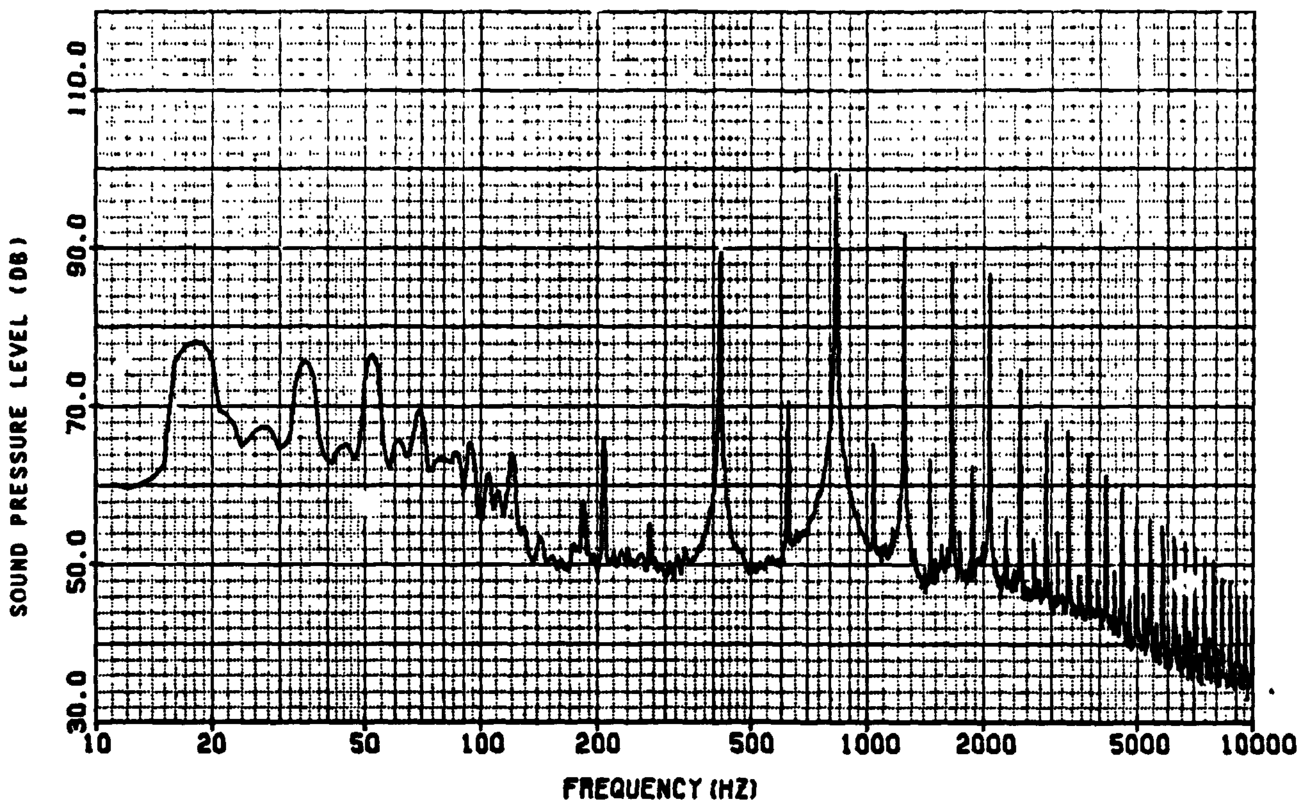
a) Narrowband Analysis



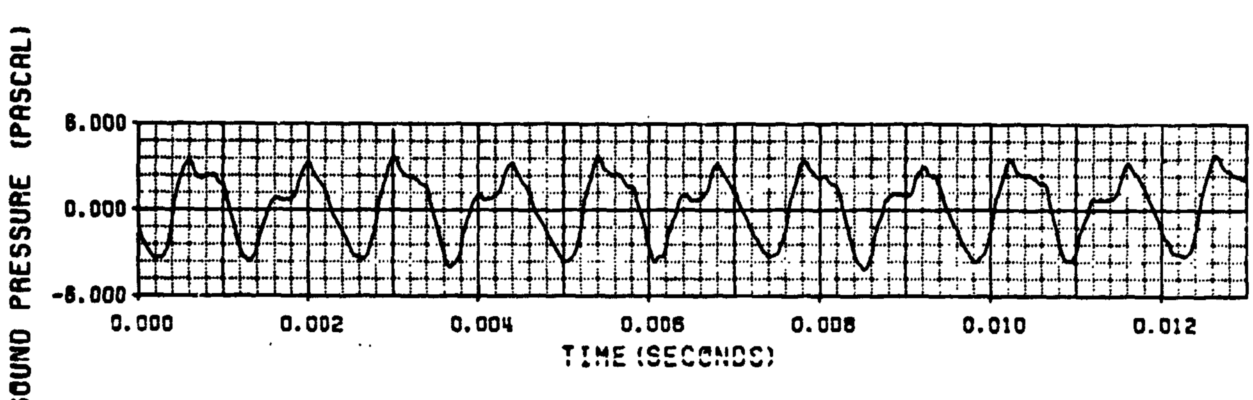
b) Time History

RUN 94 CONF T16TF39 TR THRUST 0 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY

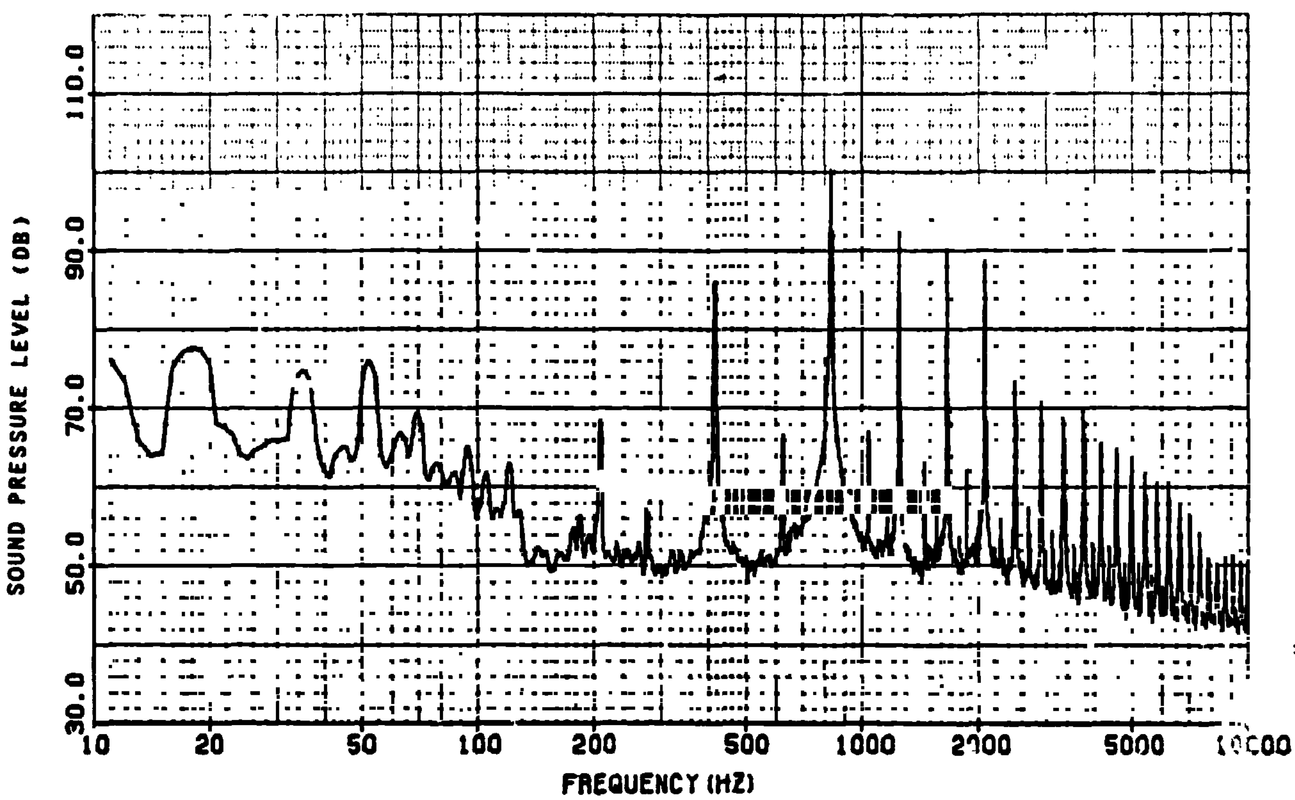


a) Narrowband Analysis

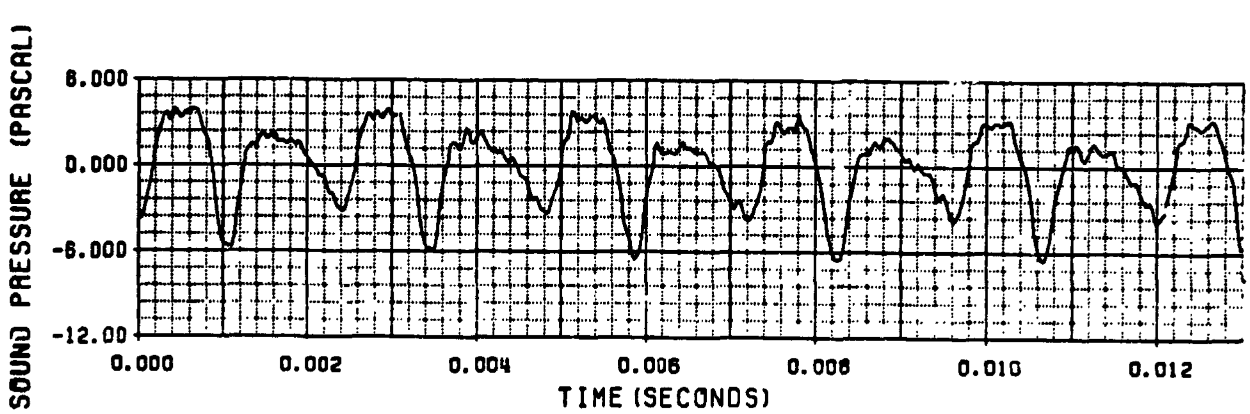


b) Time History

RUN 94 CONF T16TF39 TR THRUST 17 N MIKE 4

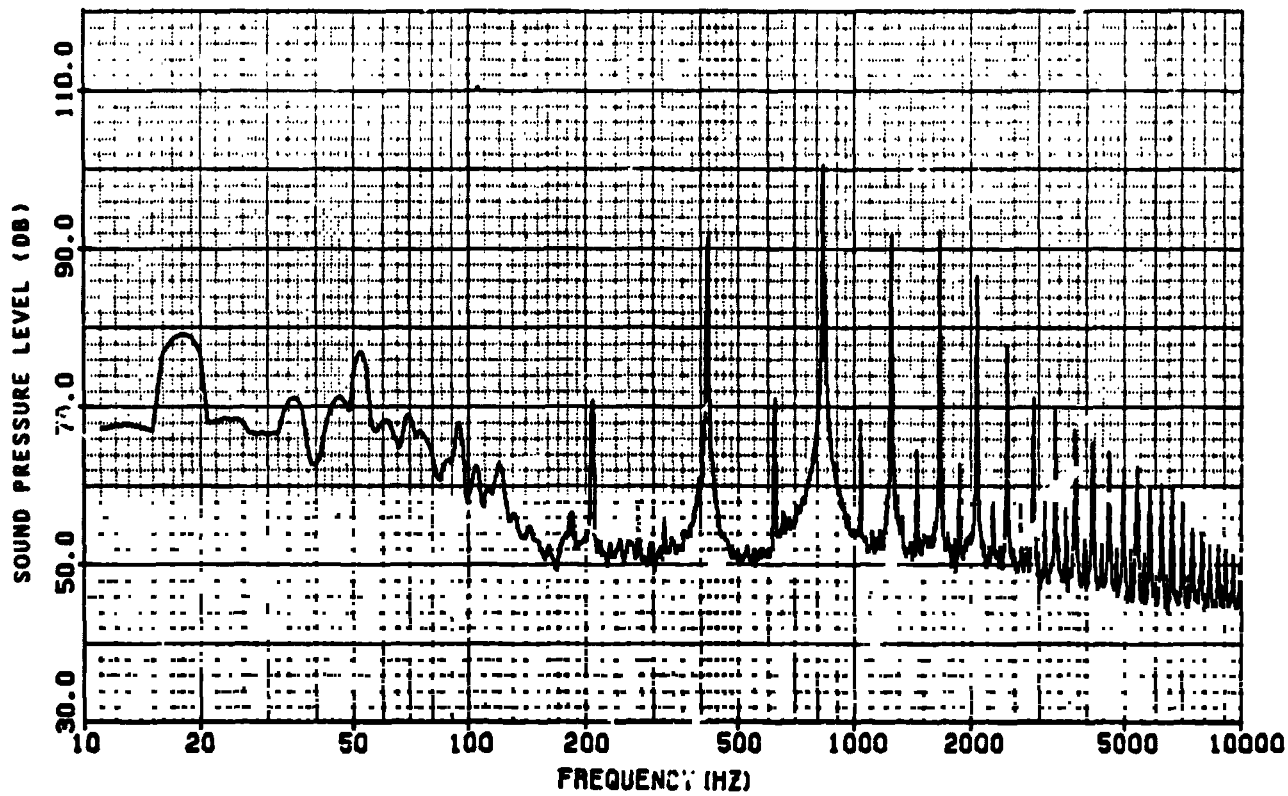


a) Narrowband Analysis

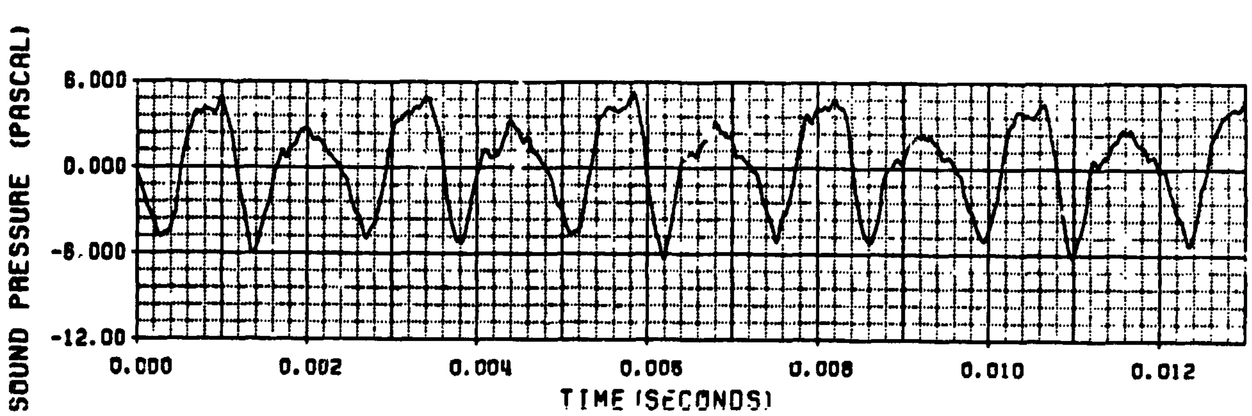


b) Time History

RUN 94 CONF T18TF38 TR THRUST 35 N MIKE 4

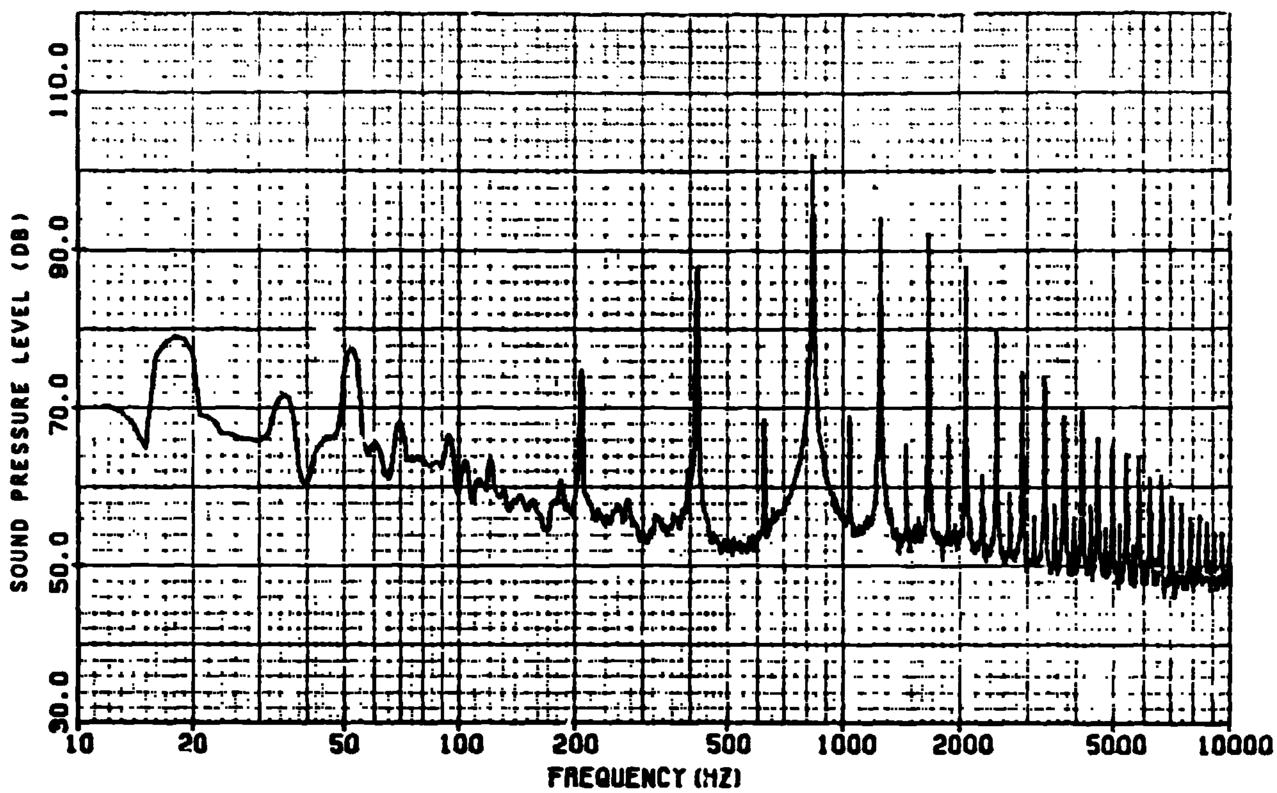


a) Narrowband Analysis

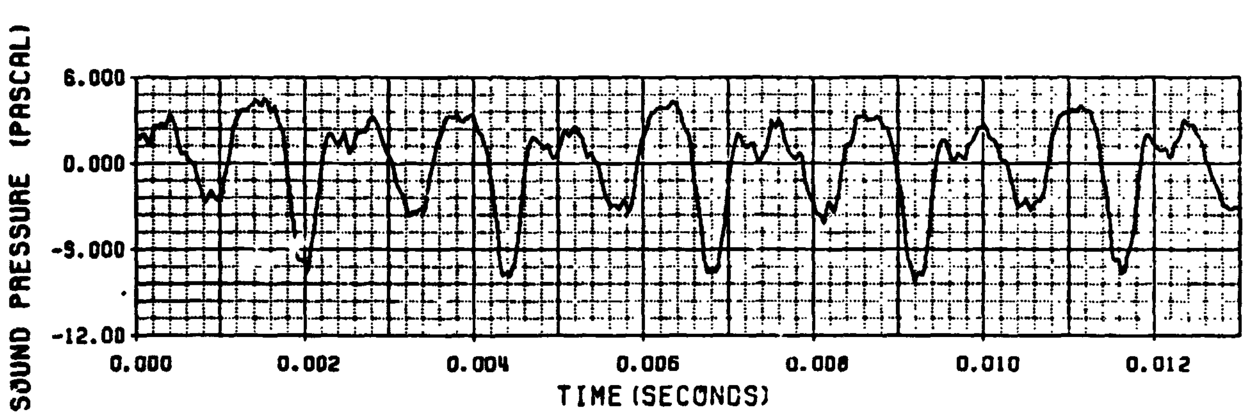


b) Time History

RUN 94 CONF T16TF38 TR THRUST 44 N MIKE 4

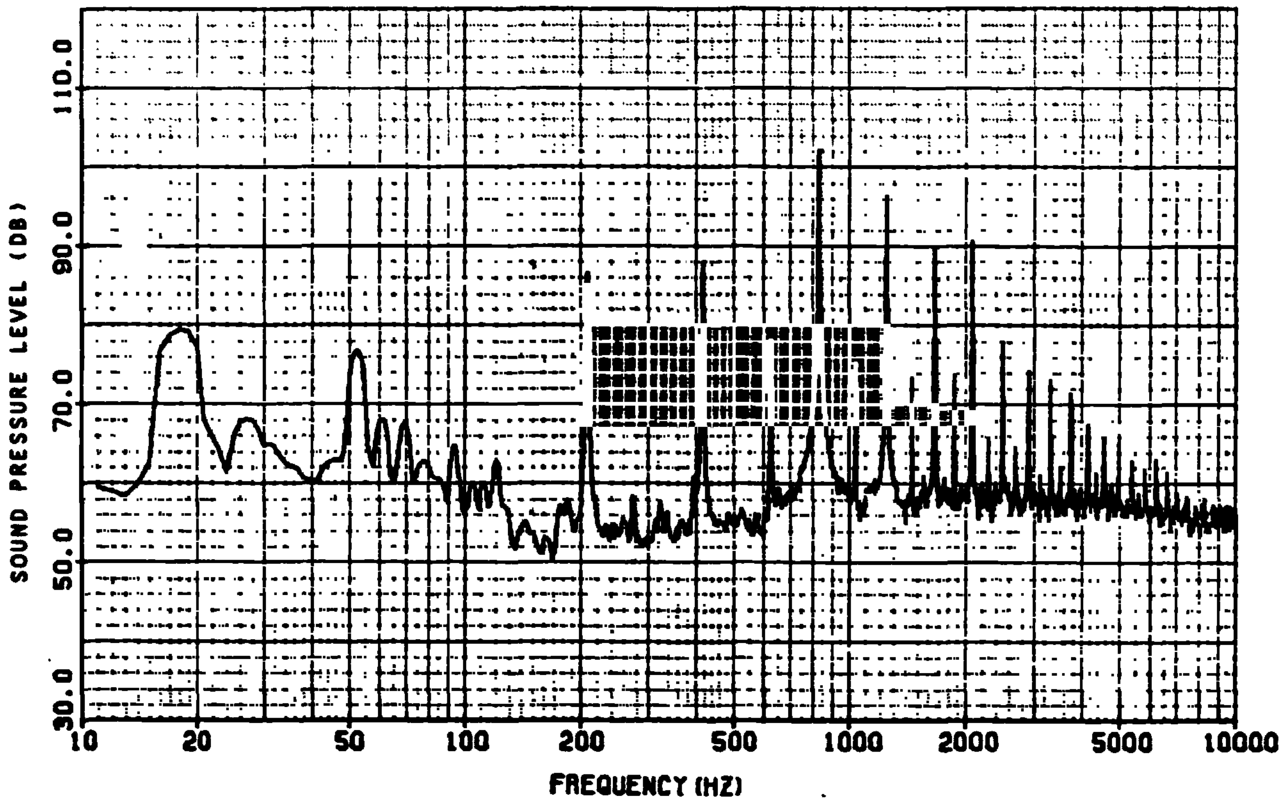


a) Narrowband Analysis

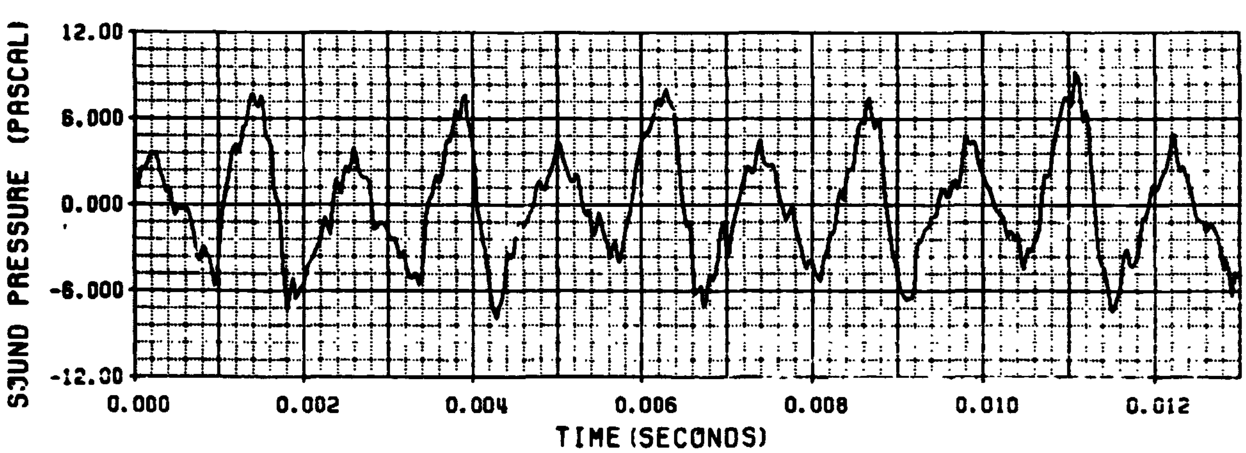


b) Time History

RUN 94 CONF T16TF39 TR THRUST 53 N MIKE 4



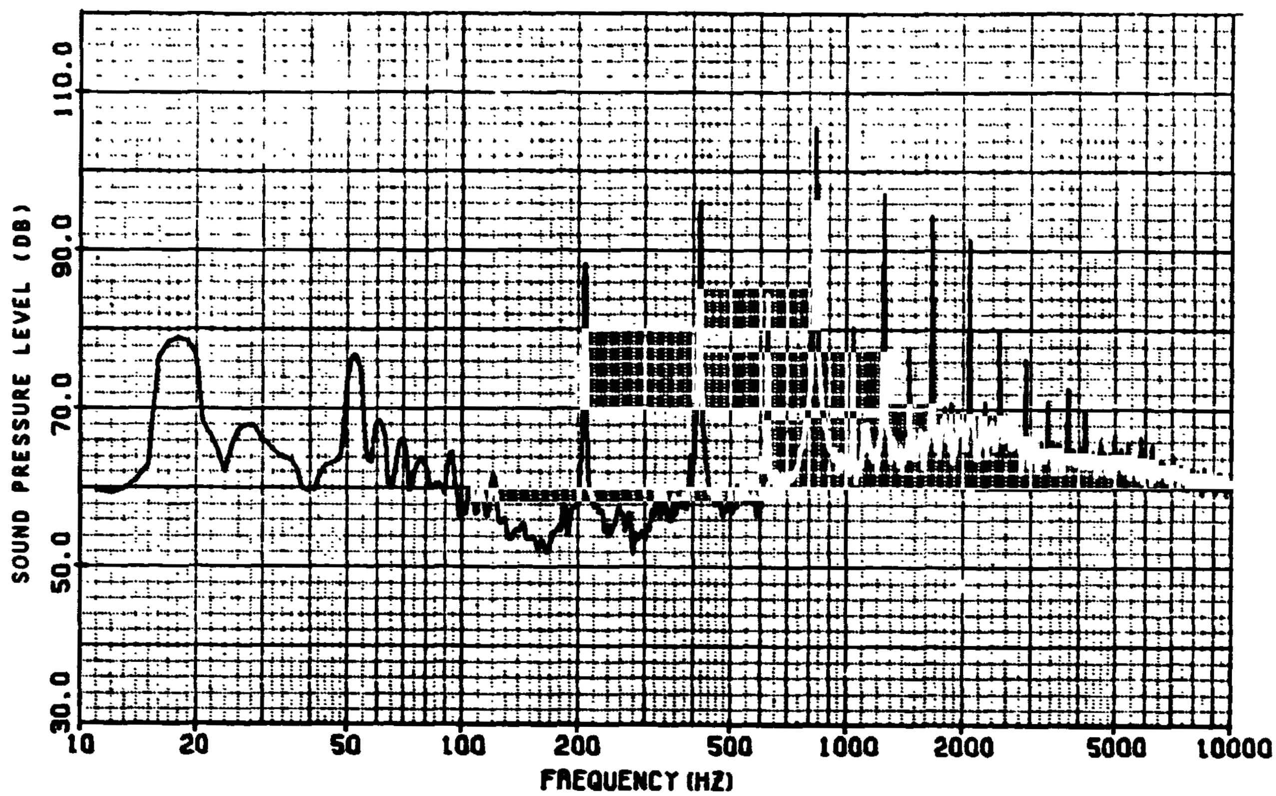
a) Narrowband Analysis



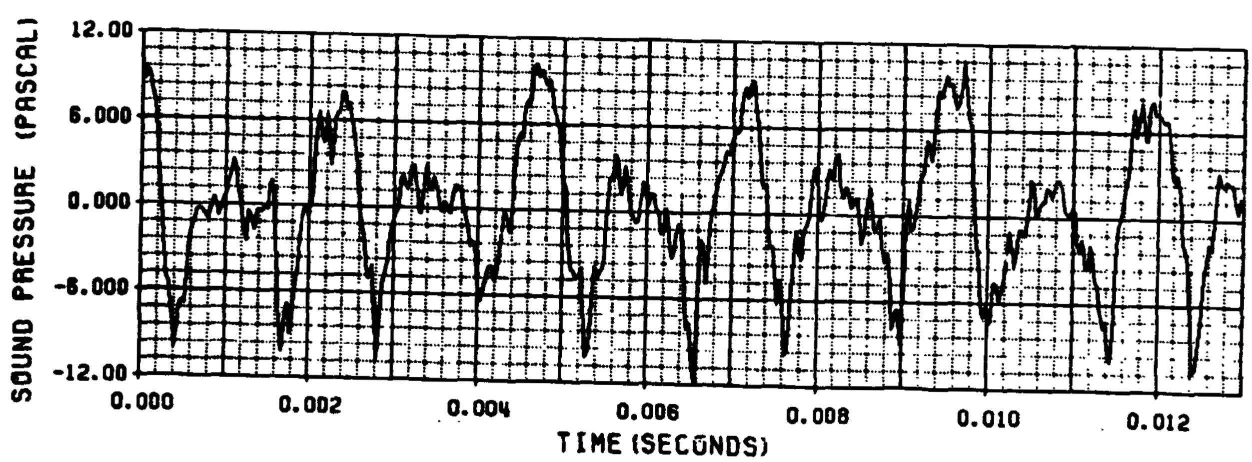
b) Time History

RUN 94 CONF T16TF39 TR THRUST 62 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY



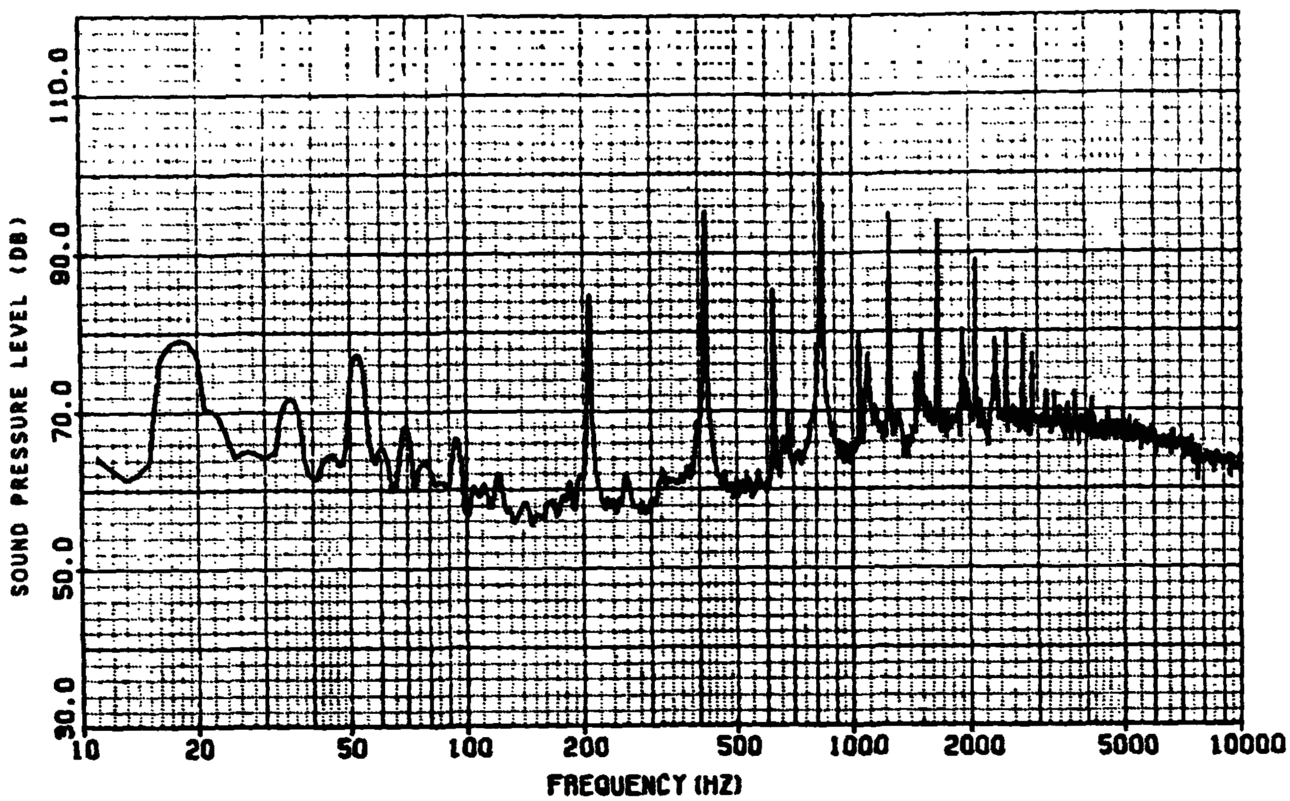
a) Narrowband Analysis



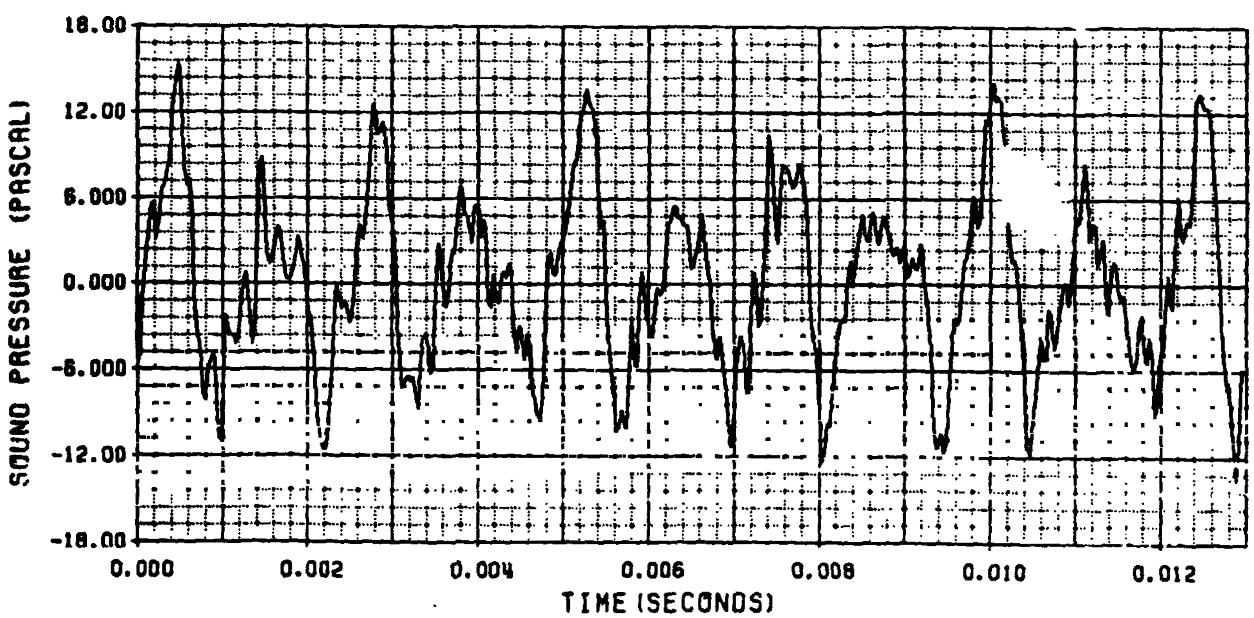
b) Time History

RUN 94 CONF T16TF39 TR THRUST 71 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY



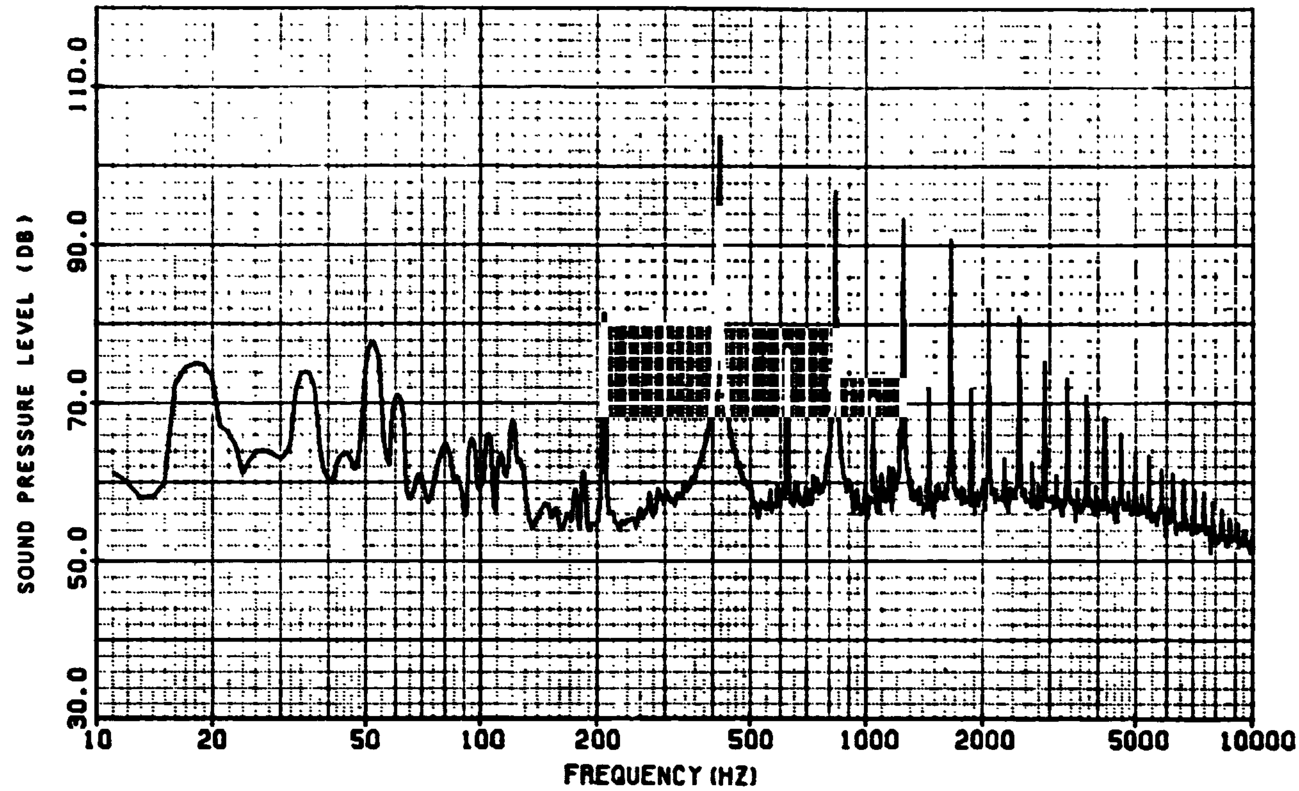
a) Narrowband Analysis



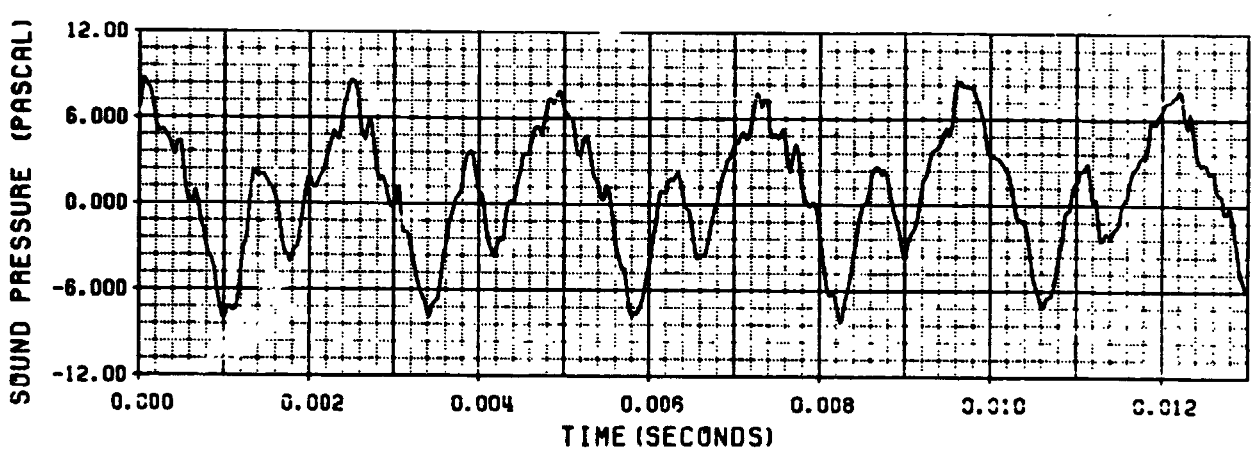
b) Time History

RUN 94 CONF T16TF39 TR THRUST 79 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY



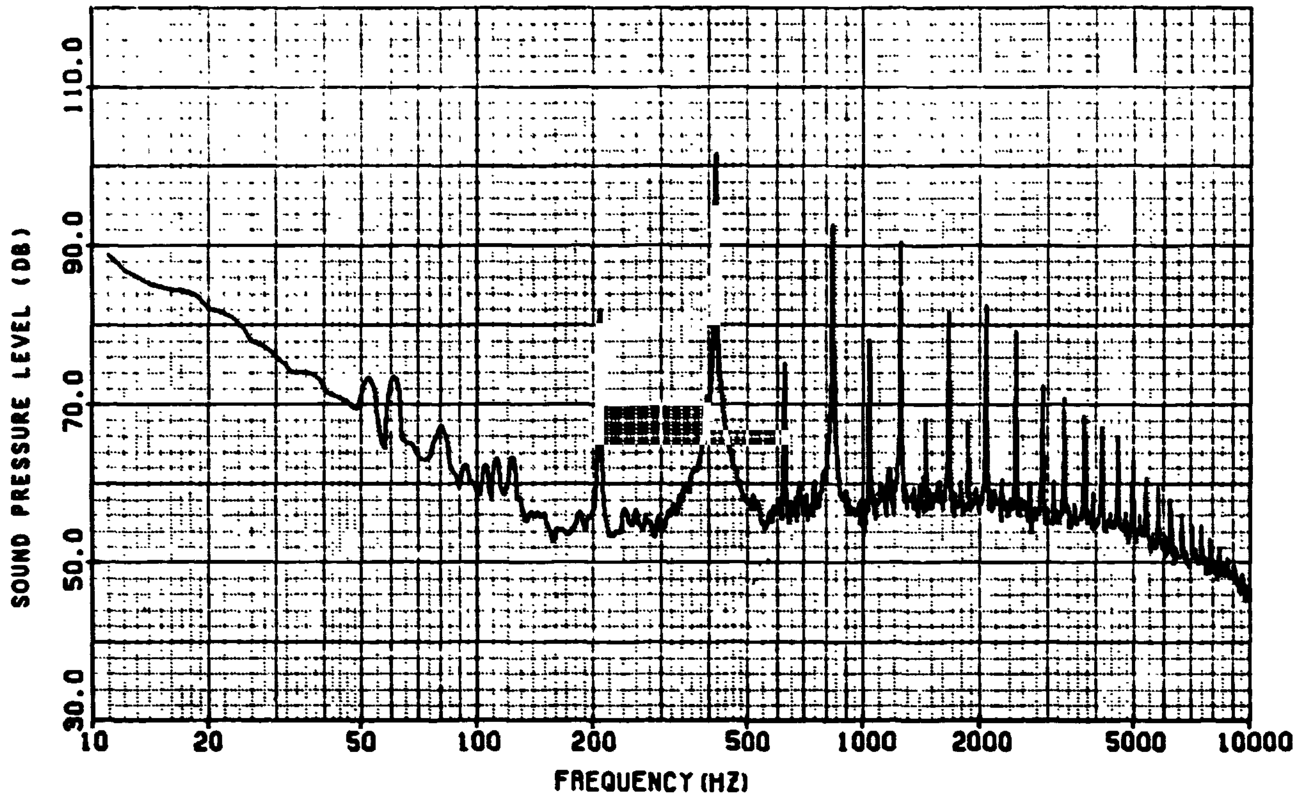
a) Narrowband Analysis



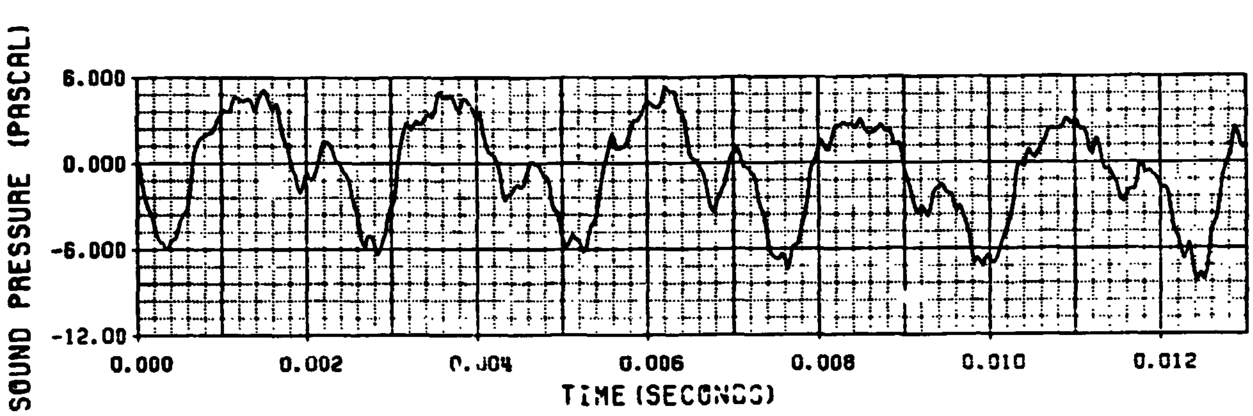
b) Time History

RUN 94 CONF T16TF39 TR THRUST 62 N MIKE 1

ORIGINAL PAGE IS
OF POOR QUALITY

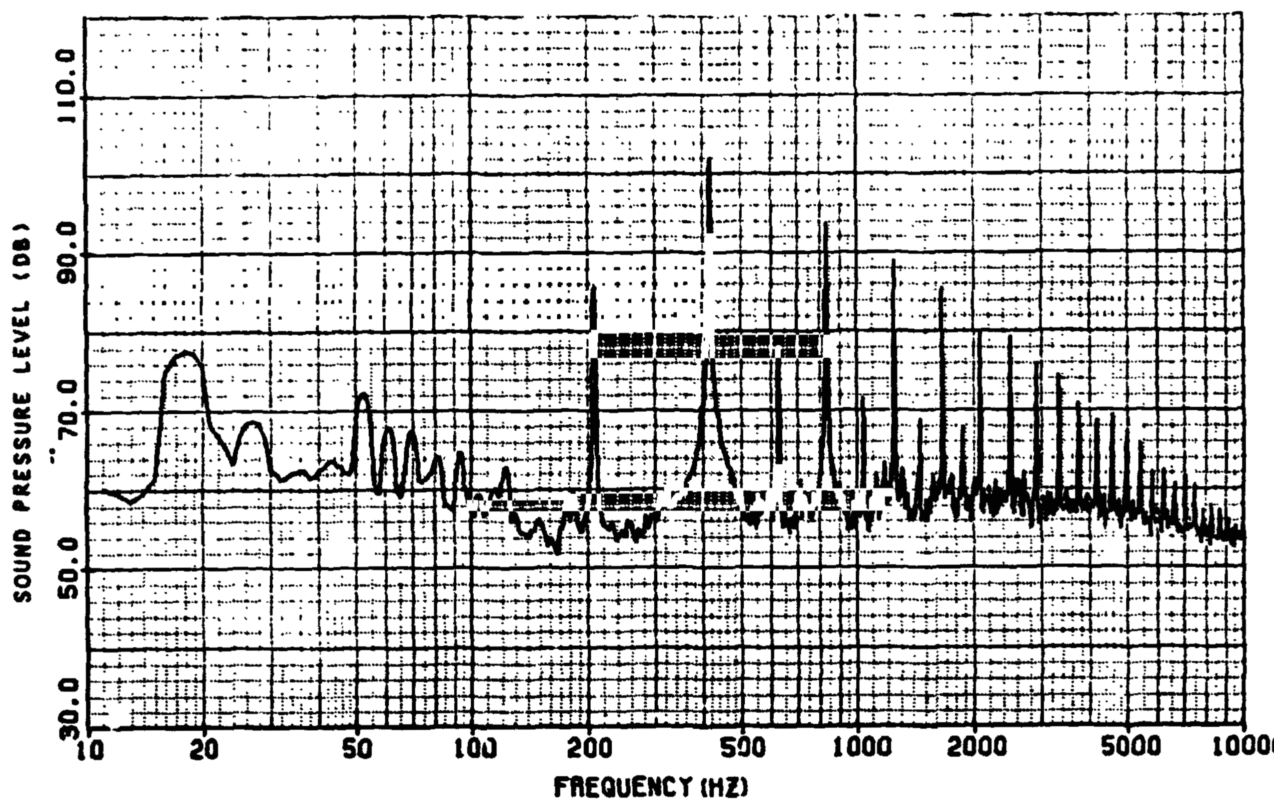


a) Narrowband Analysis

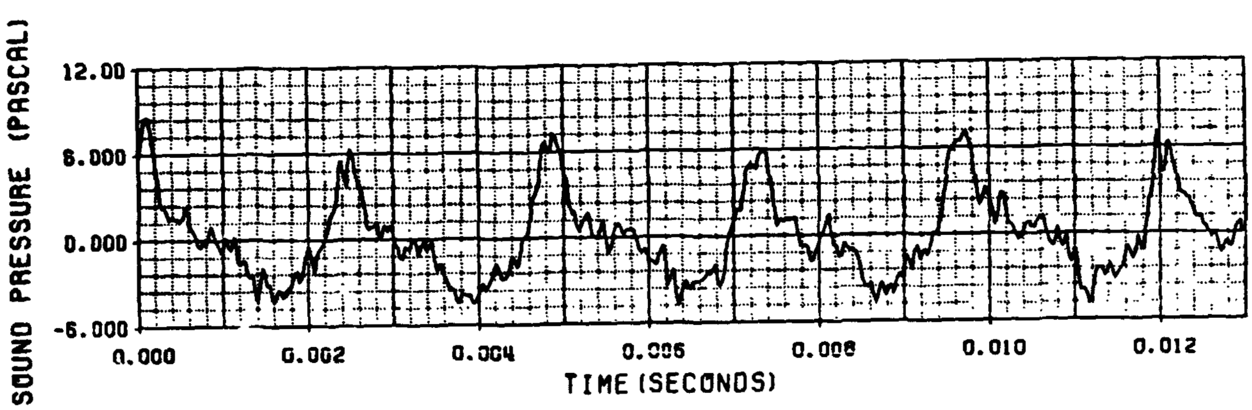


b) Time History

RUN 94 CONF T16TF39 TR THRUST 62 N MIKE 2



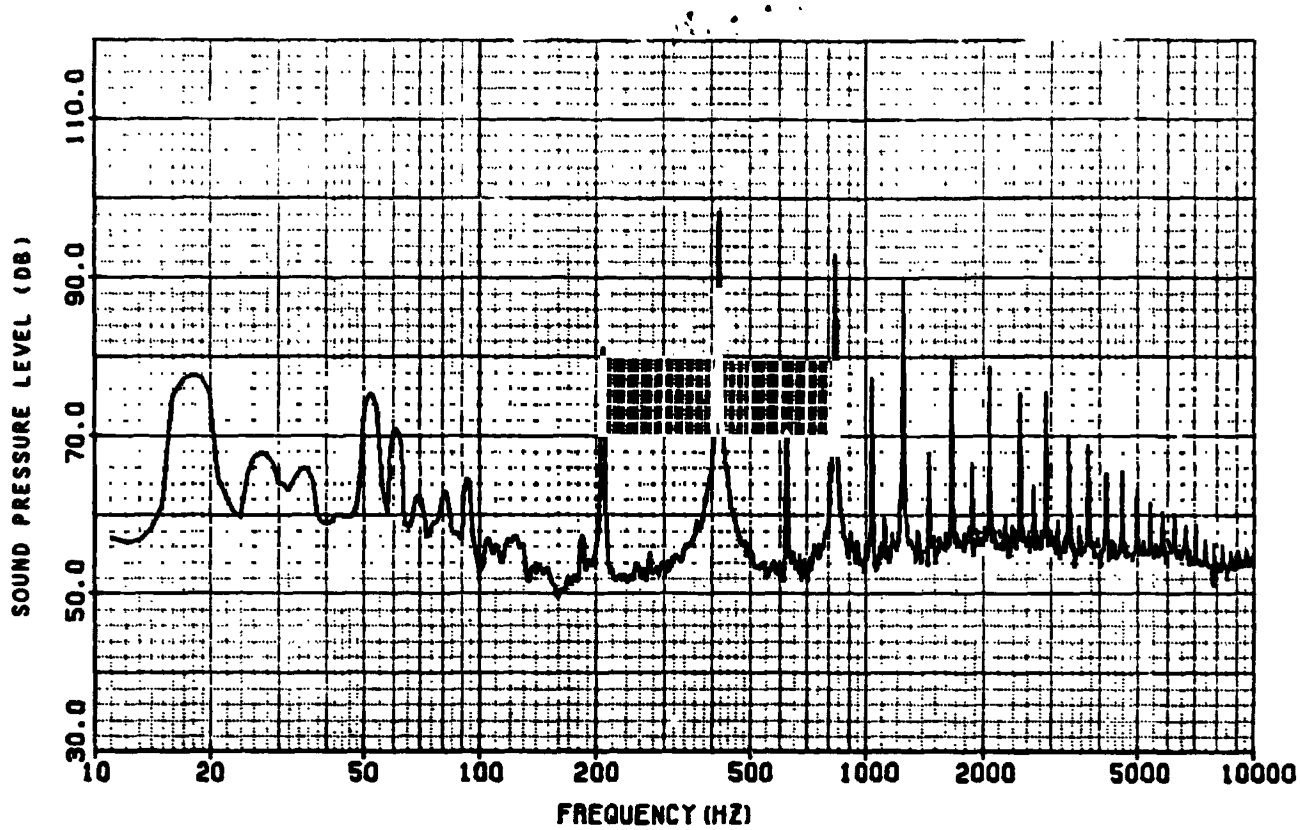
a) Narrowband Analysis



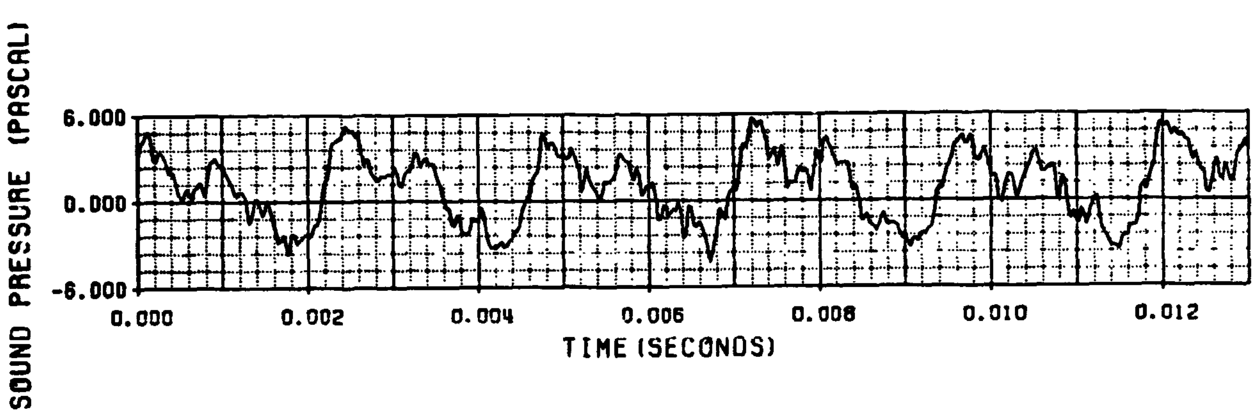
b) Time History

RUN 94 CONF T16TF39 TR THRUST 62 N MIKF 3

ORIGINAL PAGE IS
OF POOR QUALITY



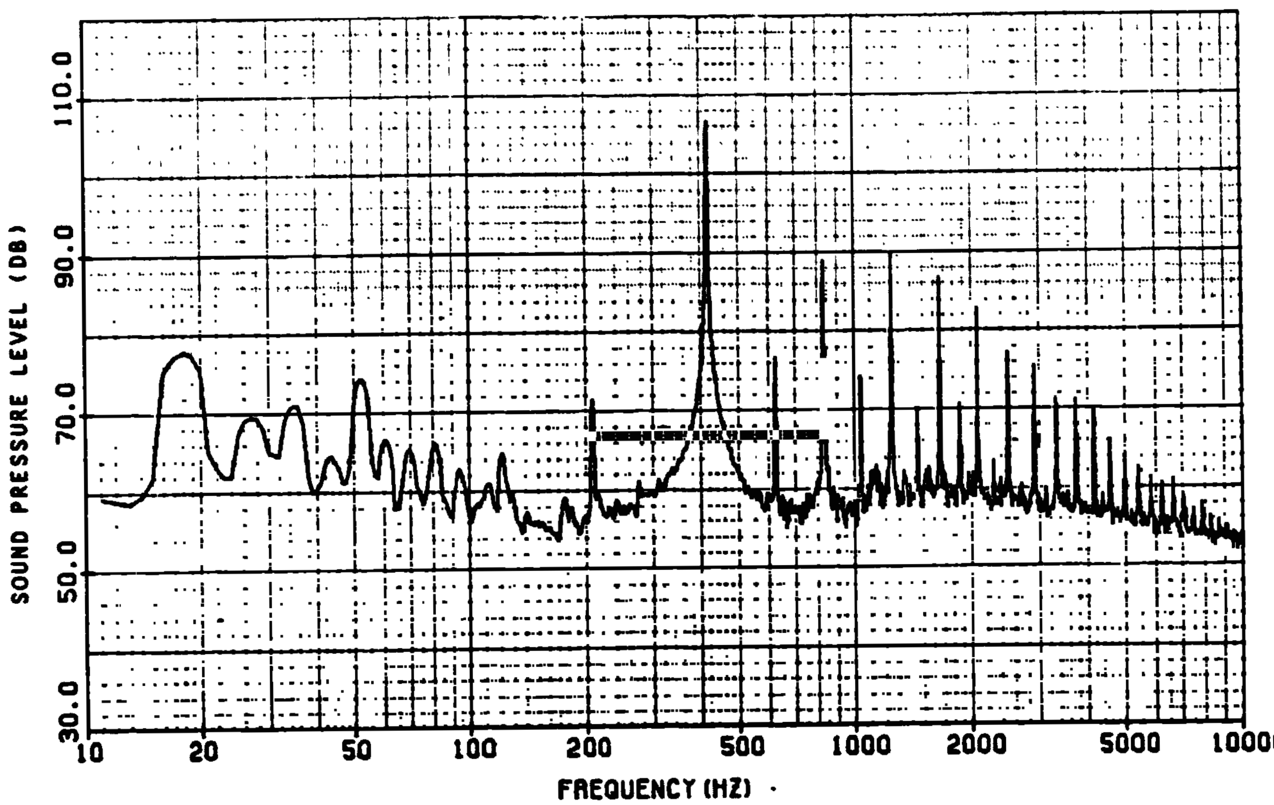
a) Narrowband Analysis



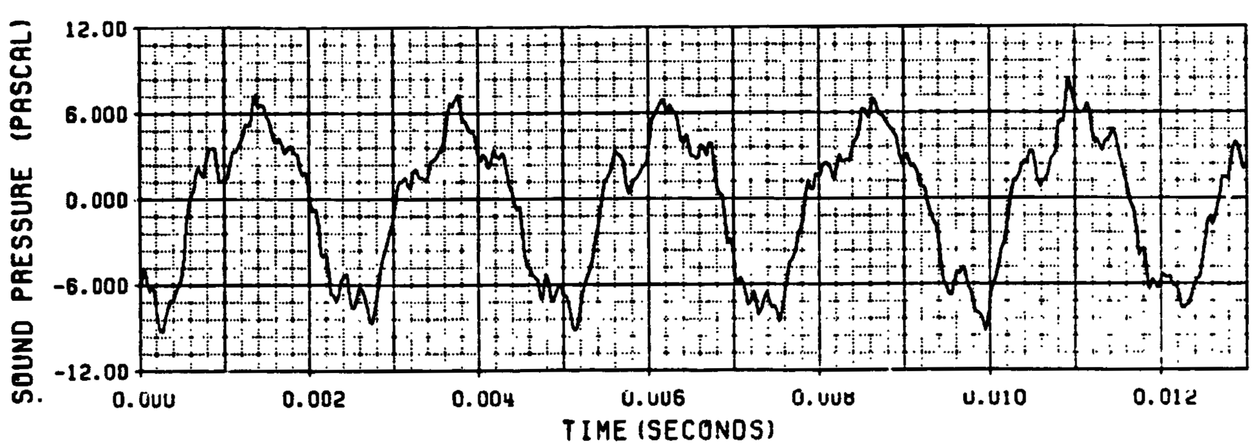
b) Time History

RUN 94 CONF T16TF39 TR THRUST 62 N MIKE 5

ORIGINAL PAGE IS
OF POOR QUALITY



a) Narrowband Analysis

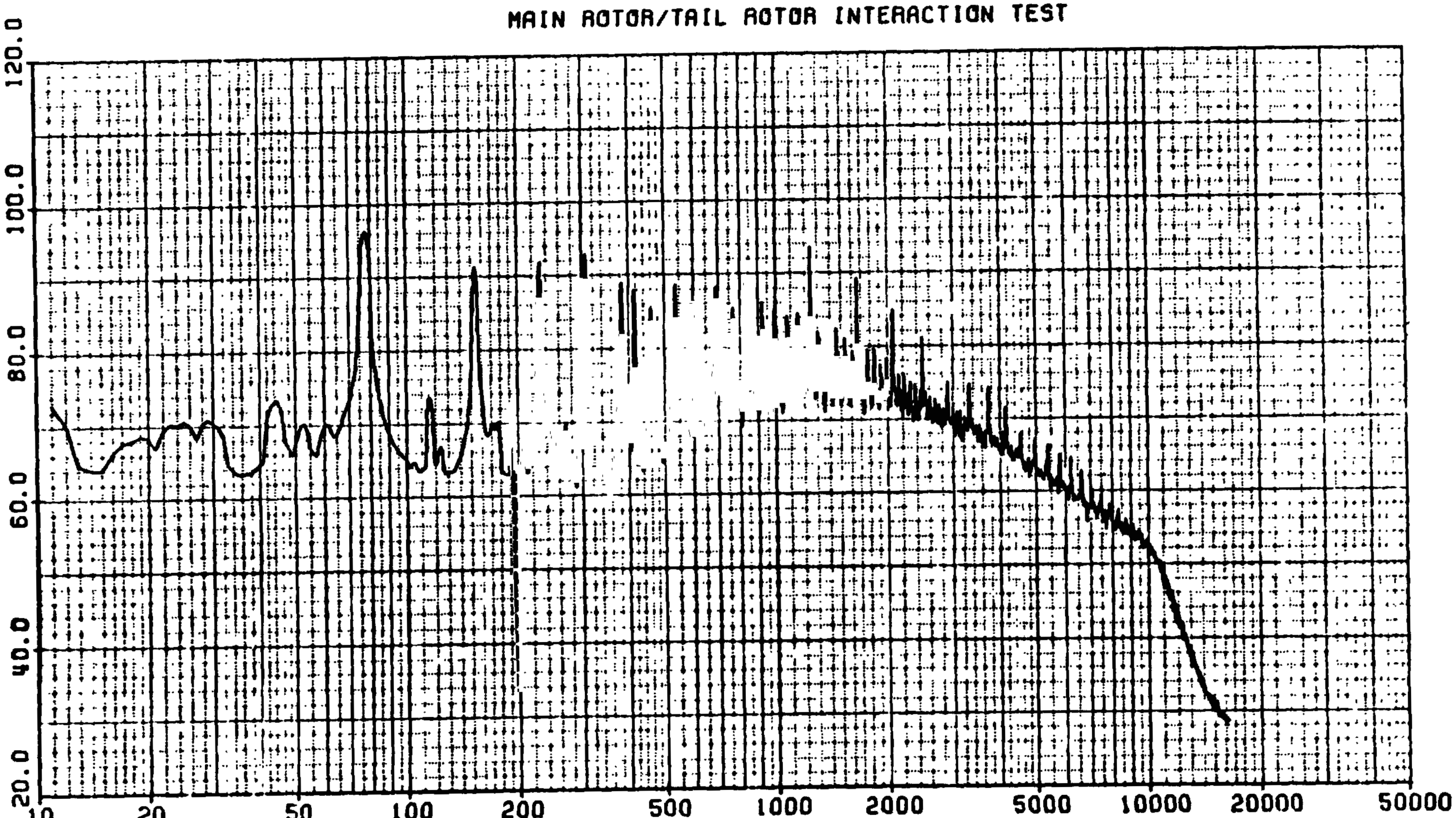


b) Time History

RUN 94 CONF T16TF39 TR THRUST 62 N MIKE 6

SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST

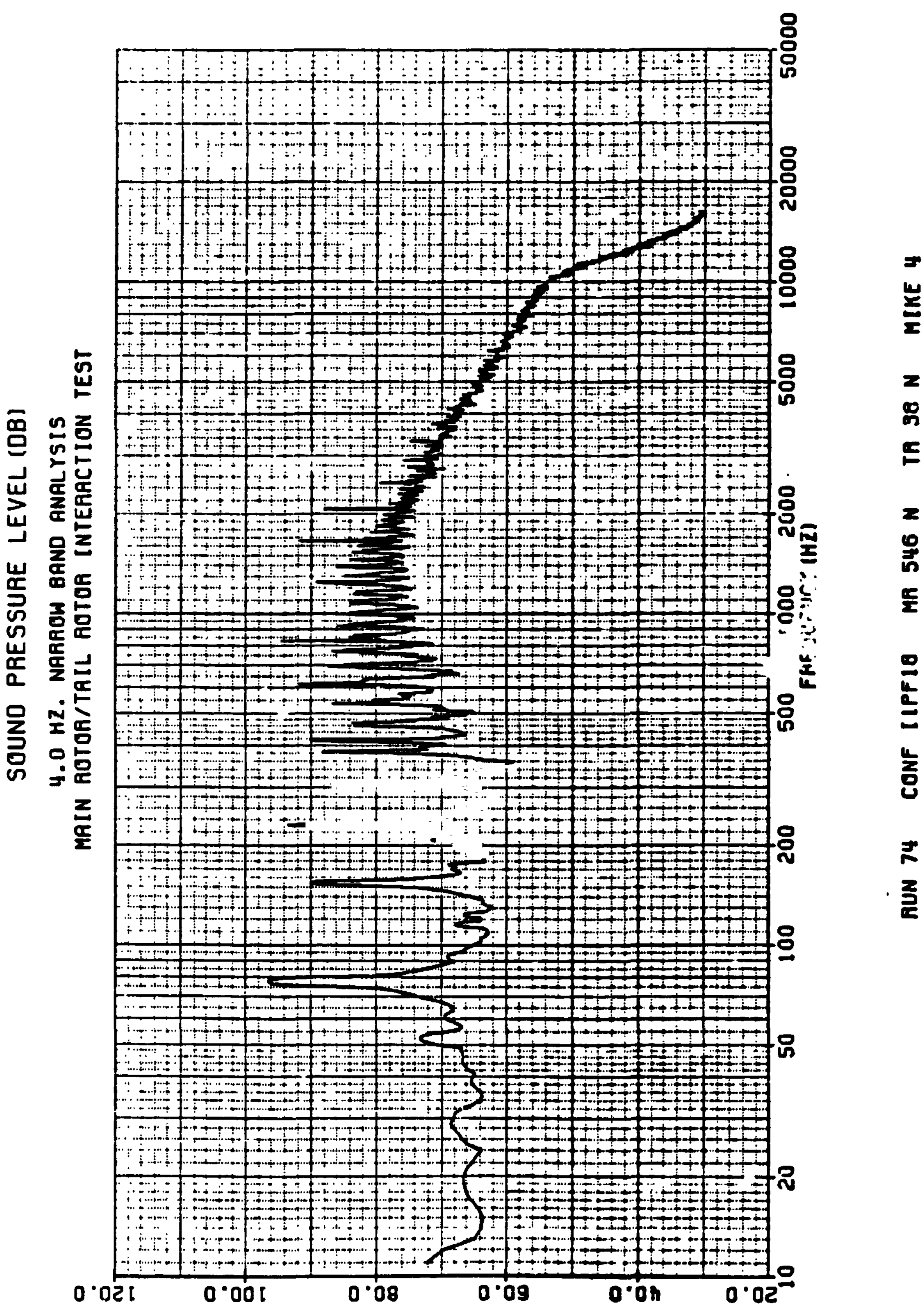


FREQUENCY (HZ)

RUN 74 CONF IIPF18 MR 331 N TR 25 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY

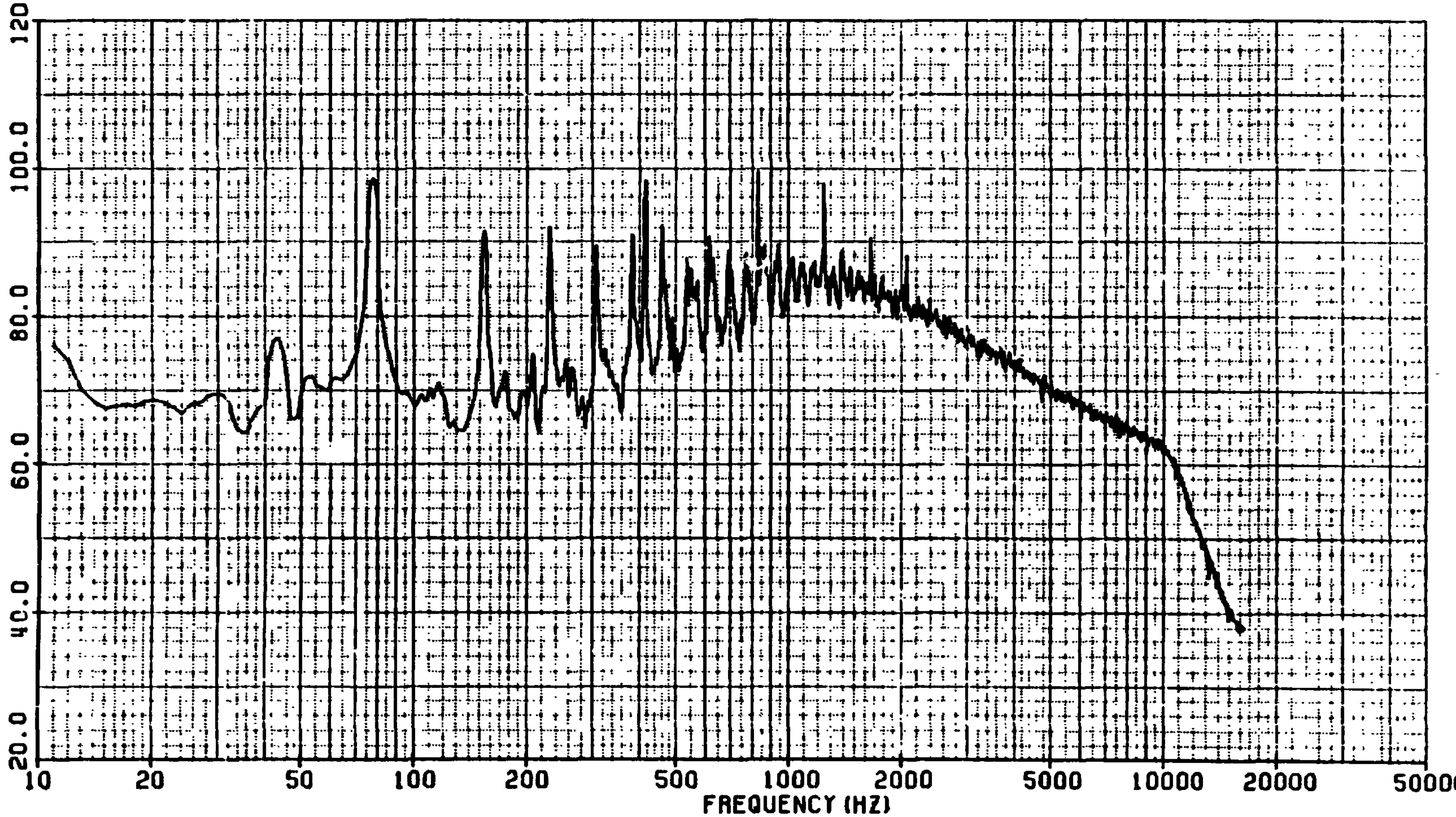
ORIGINAL PAGE IS
OF POOR QUALITY



SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS

MAIN ROTOR/TAIL ROTOR INTERACTION TEST

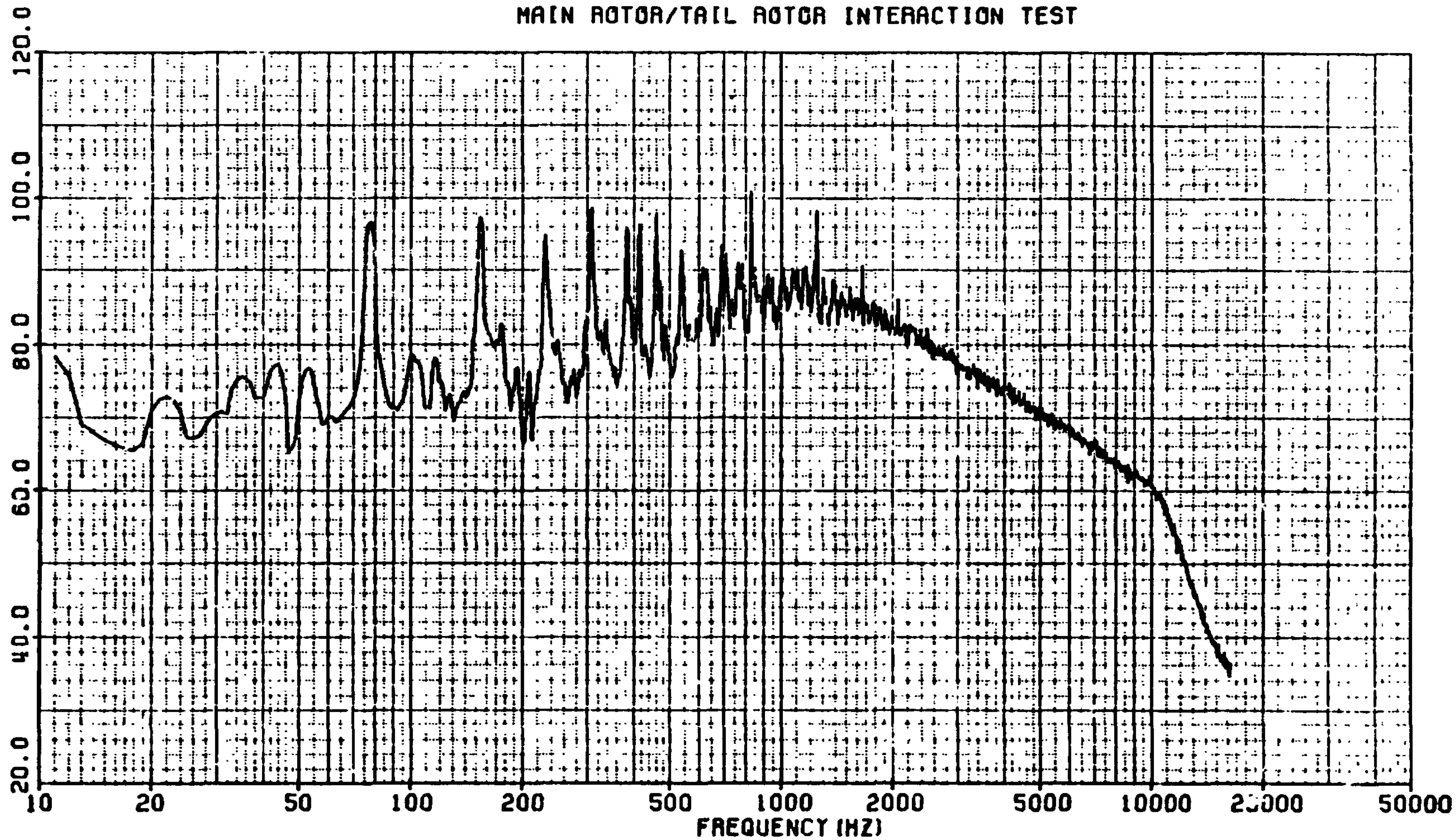


RUN 74 CONF IIPF18 MR 775 N TR 55 N MIKE 4

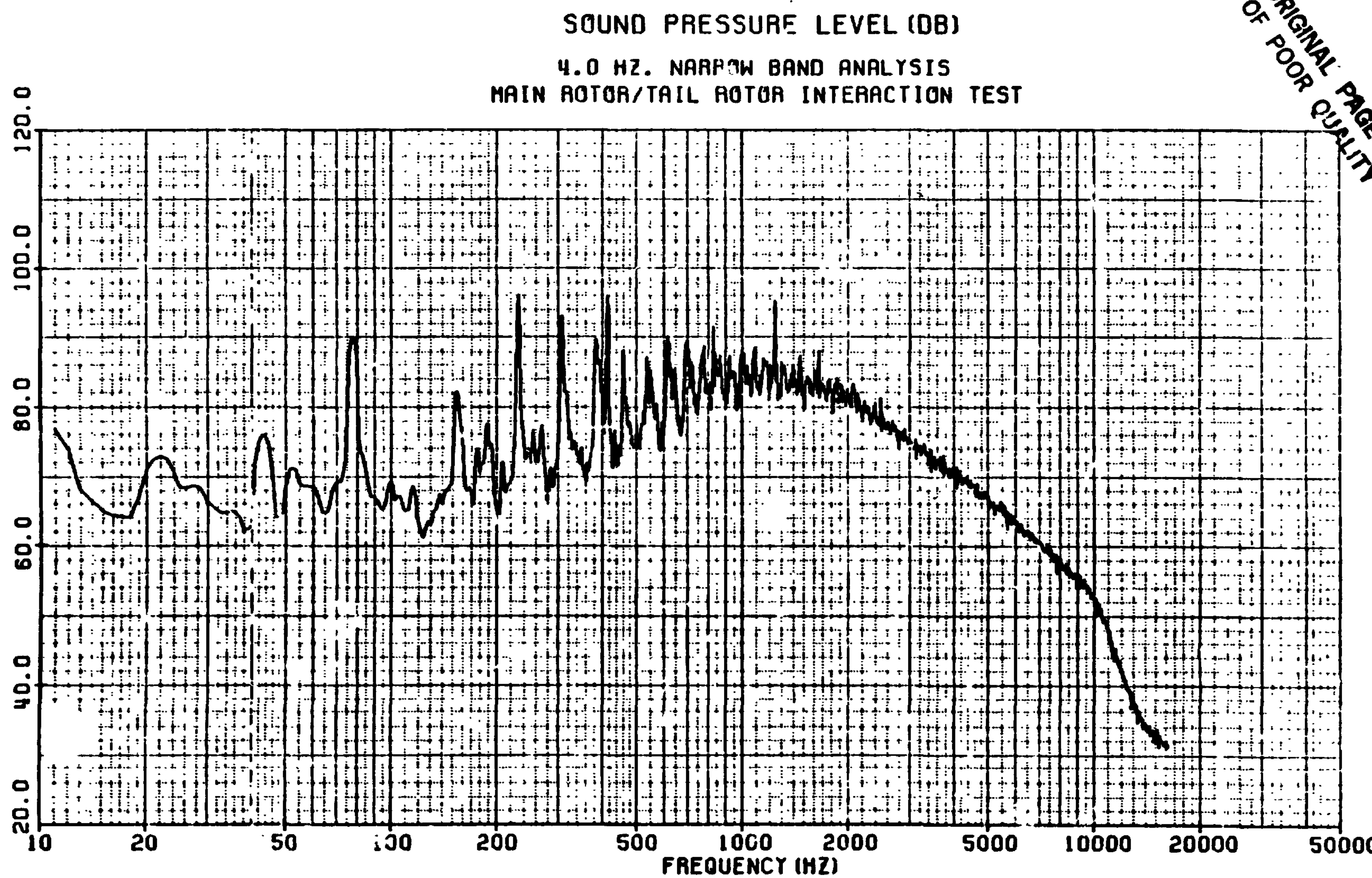
SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS

MAIN ROTOR/TAIL ROTOR INTERACTION TEST



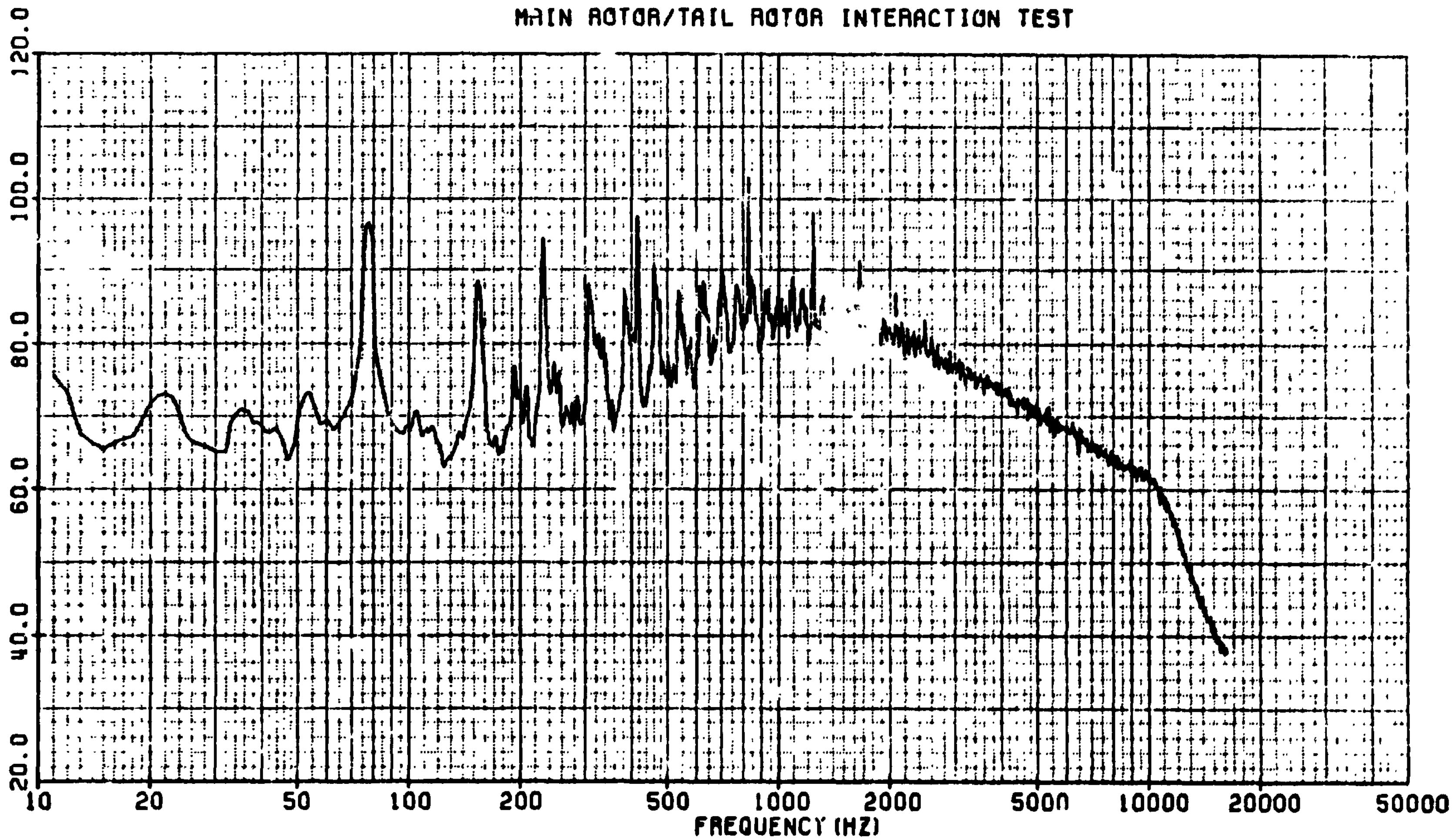
RUN 74 CONF IIPF18 MR 775 N TR 55 N MIKE 1



RUN 74 CONF IIPF18 MR 775 N TR 55 N MIKE 2

SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST

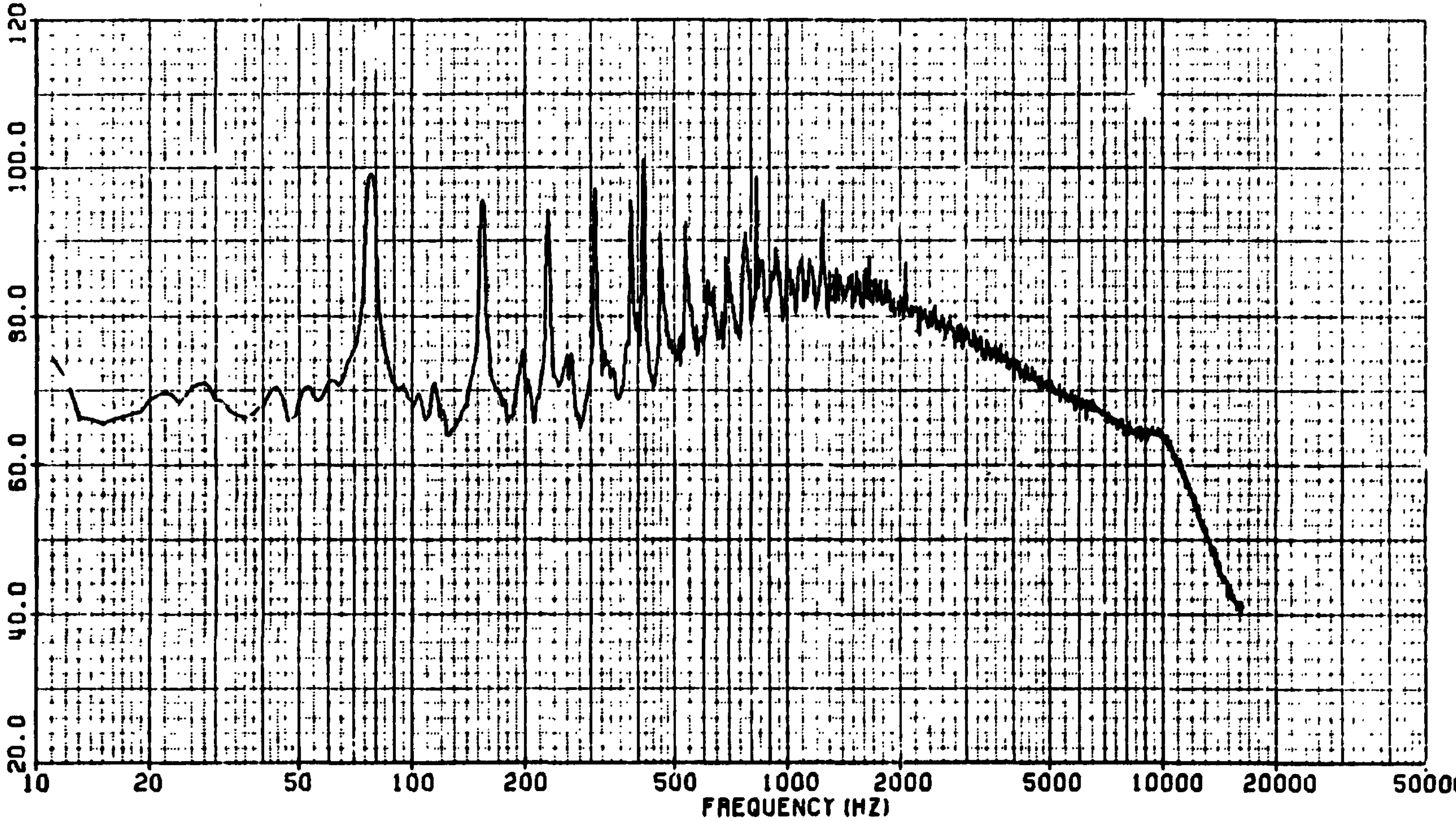


RUN 74 CONF I1PF18 MR 775 N TR 55 N MIKE 3

ORIGINAL PAGE IS
OF POOR QUALITY

SOUND PRESSURE LEVEL (DB)

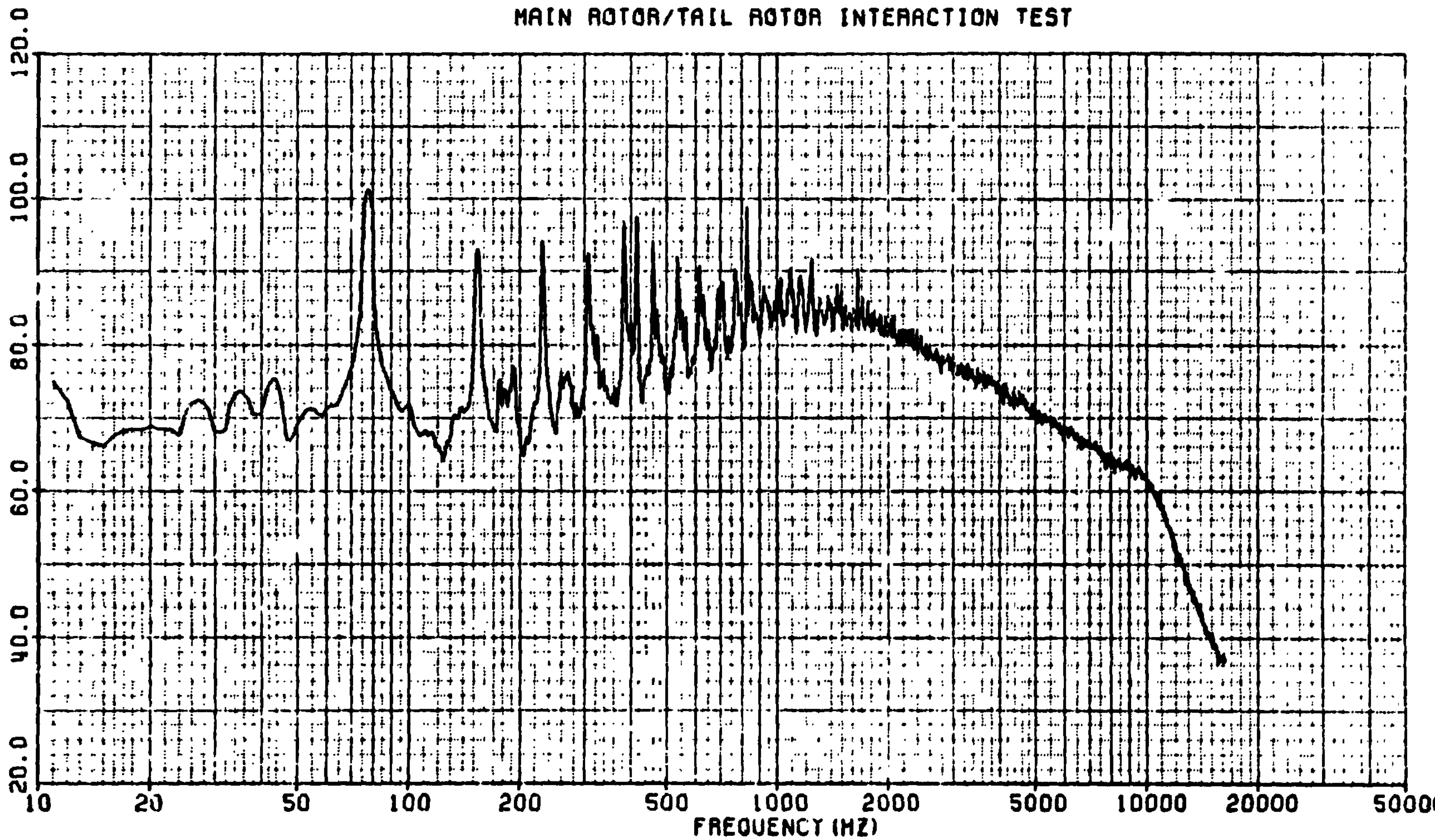
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 74 CONF [1PF18 MR 775 N TR 55 N MIKE 5

SOUND PRESSURE LEVEL (DB)

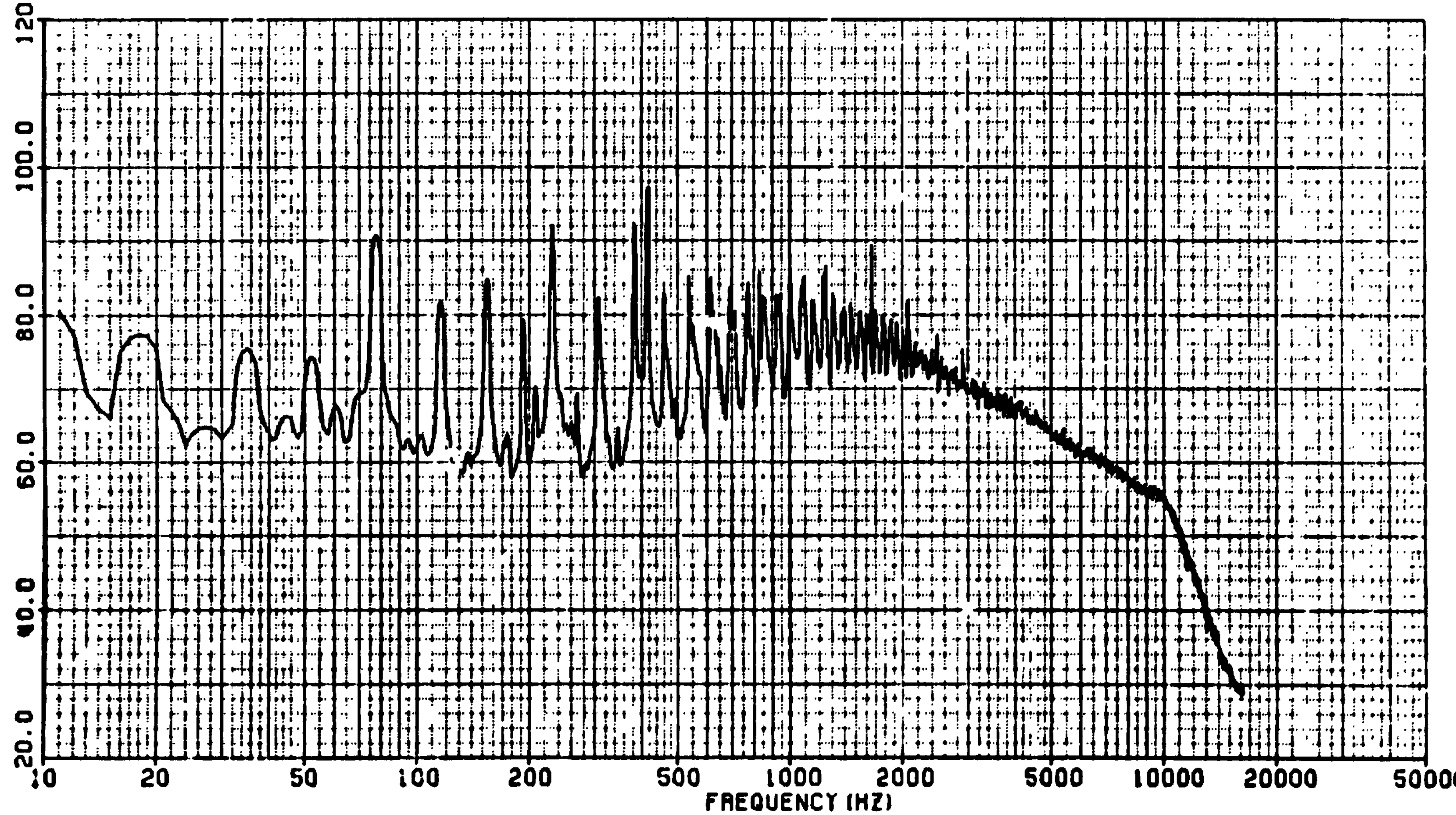
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 74 CONF 11PF18 MR 775 N TR 55 N MIKE 6

SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST

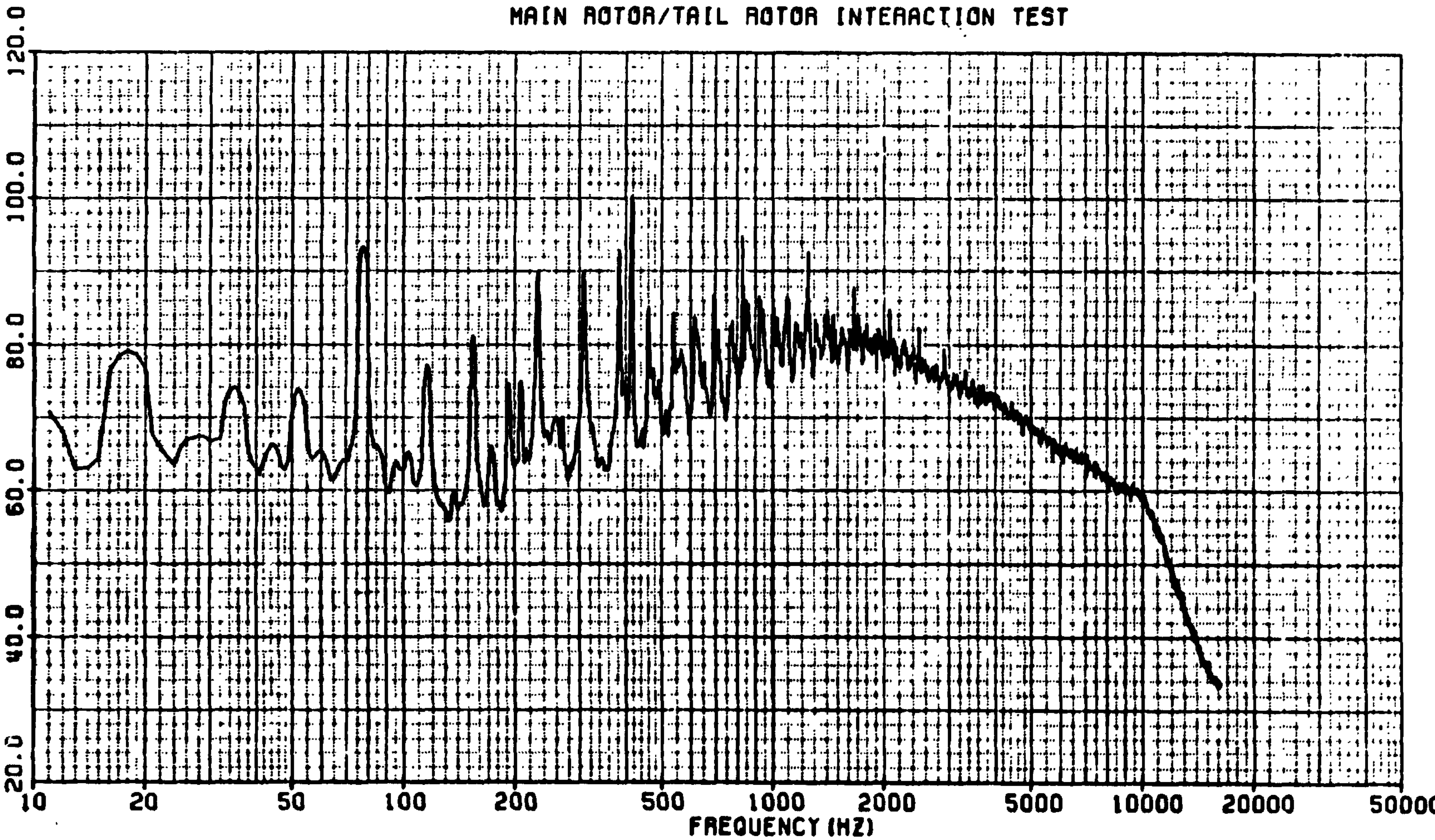


RUN 109 CONF I1TF18 MR 327 N TR 26 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY

SOUND PRESSURE LEVEL (DB)

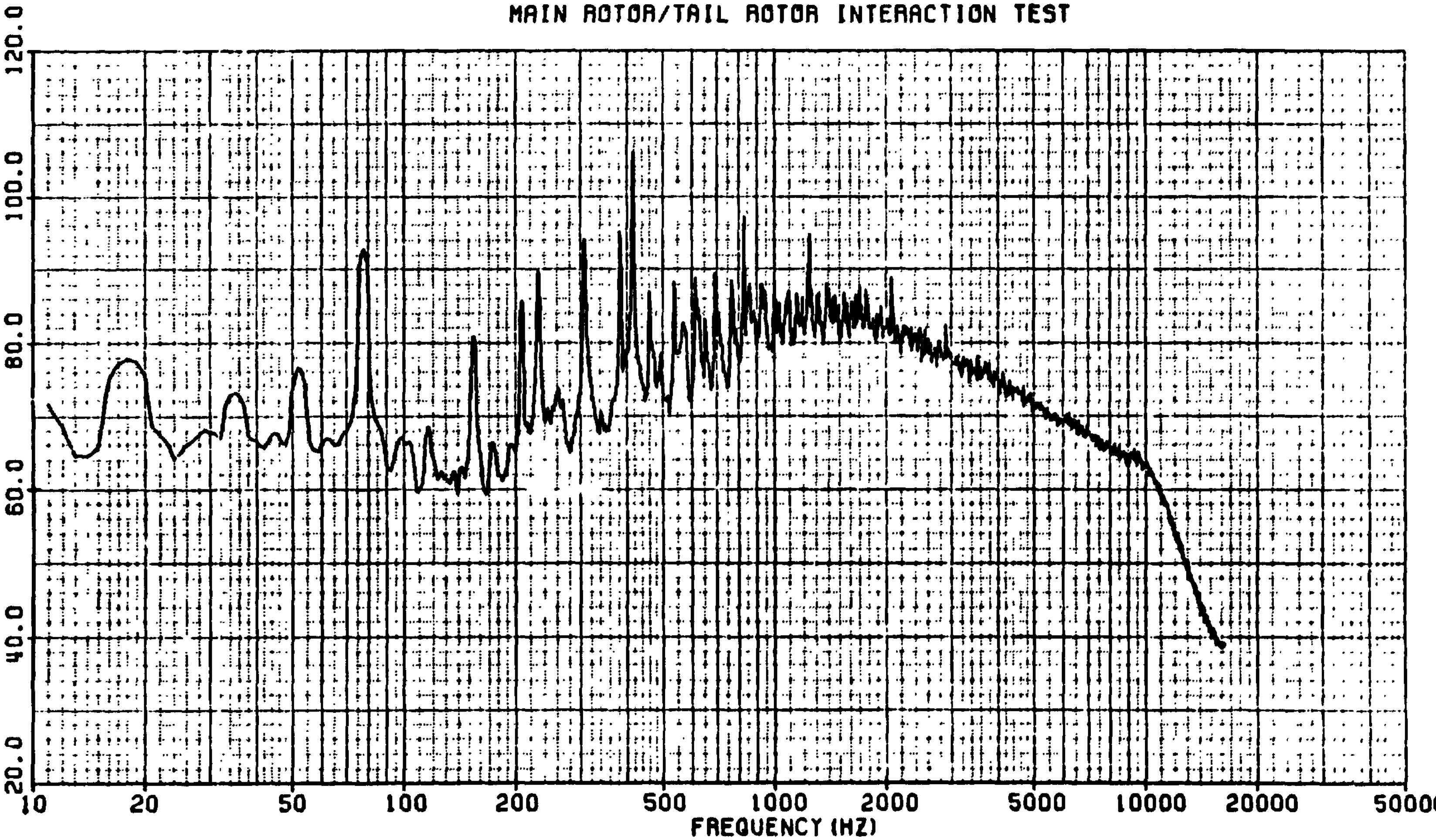
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 109 CONF I1TF18 MR 555 N TR 45 N MIKE 4

SOUND PRESSURE LEVEL (DB)

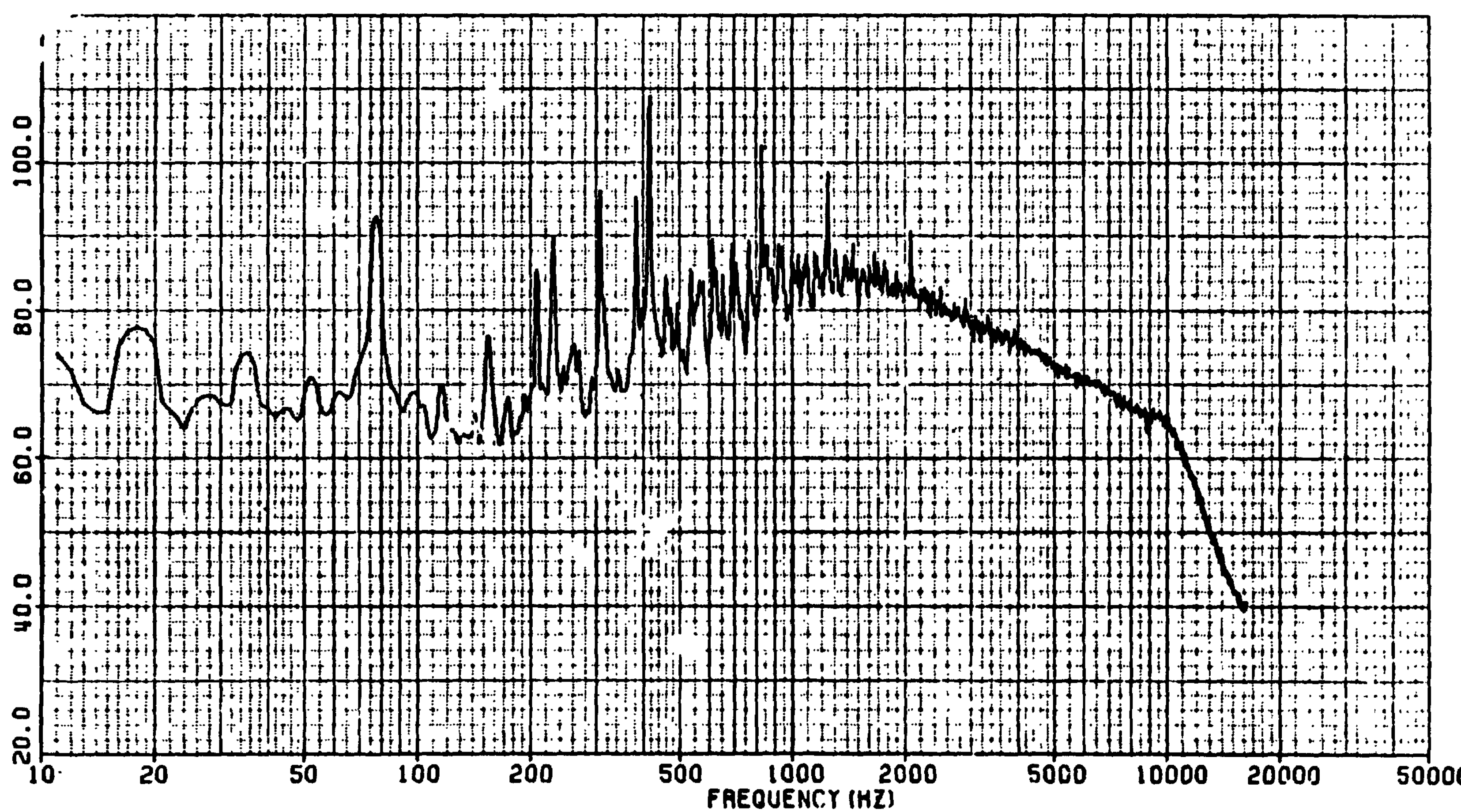
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 109 CONF I1TF18 MR 780 N TR 68 N MIKE 4

SOUND PRESSURE LEVEL (DB)

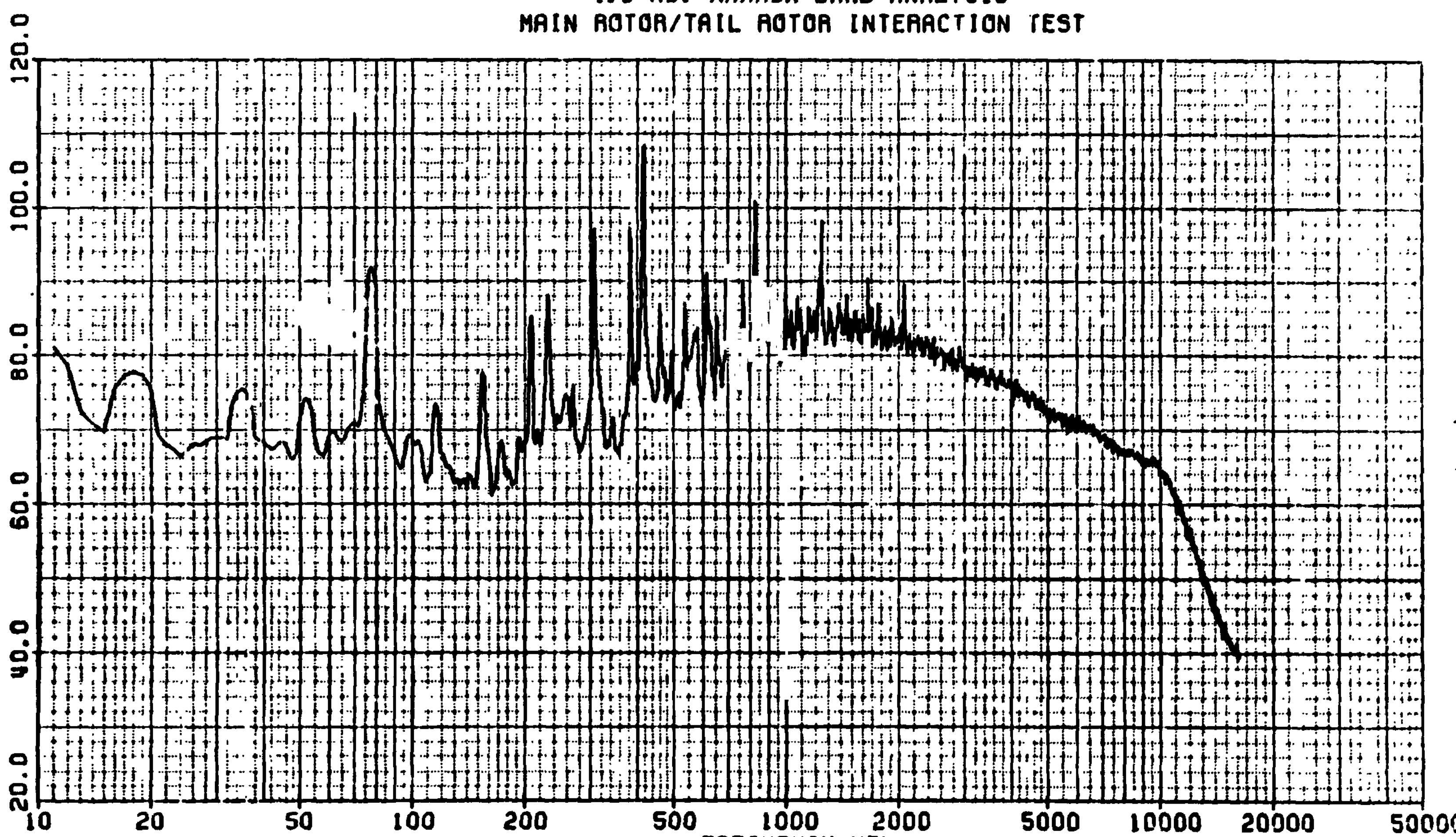
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 109 CONF I1TF18 MR 875 N TR 75 N MIKE 4

SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



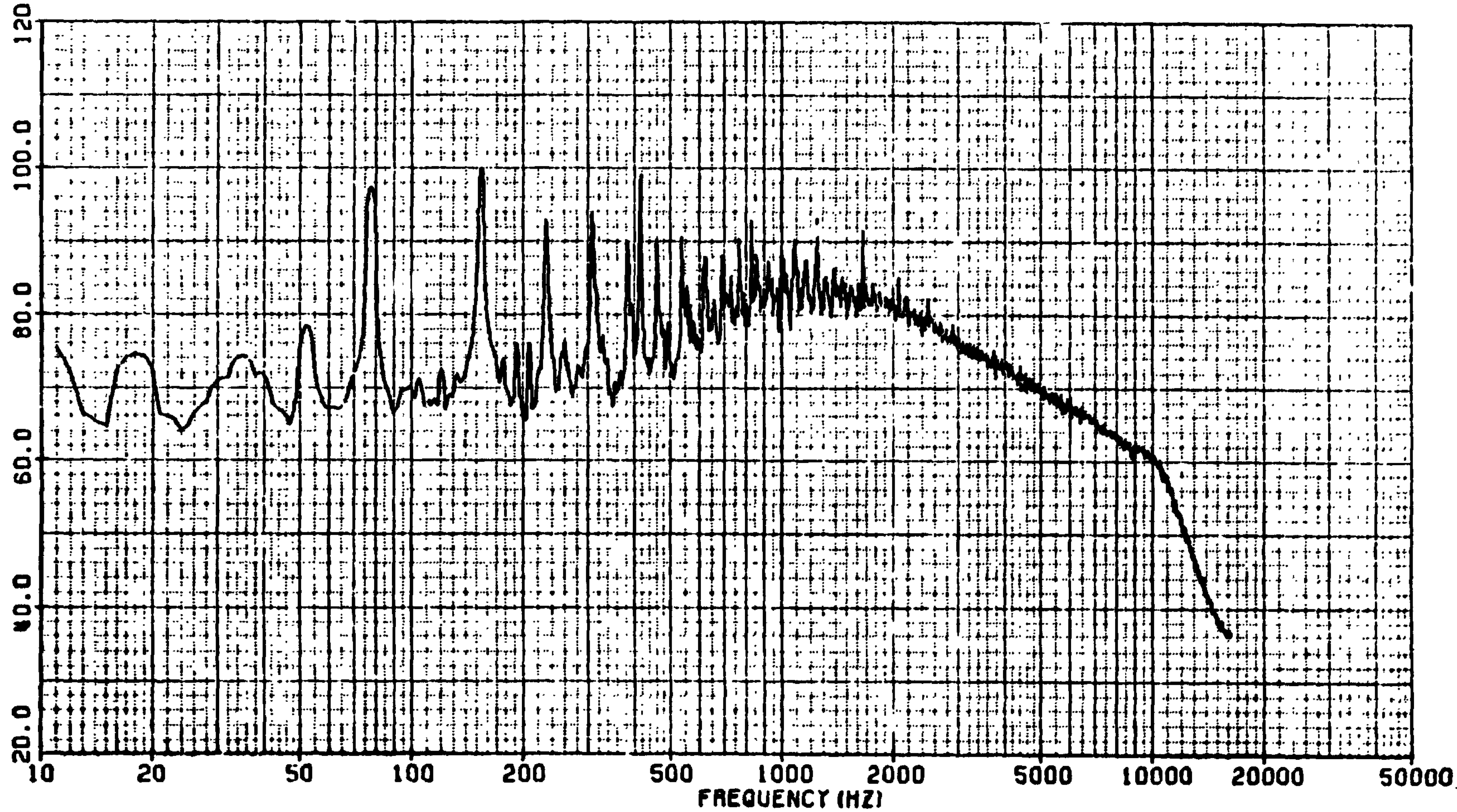
RUN 109 CONF I1TF18 MR 1003 N TR 75 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY

INAL PAGE IS
'OOR QUALITY

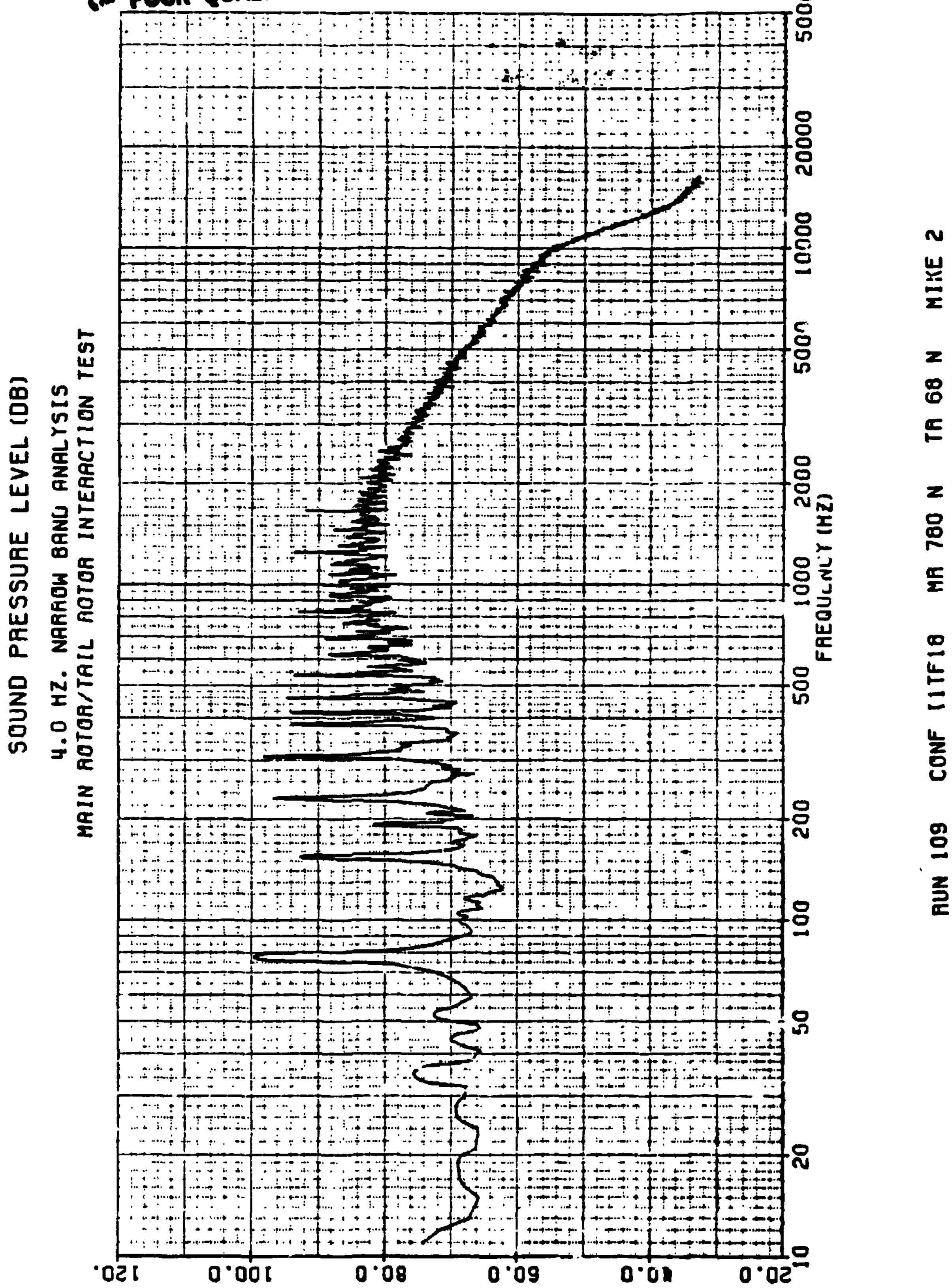
SOUND PRESSURE LEVEL (DB)

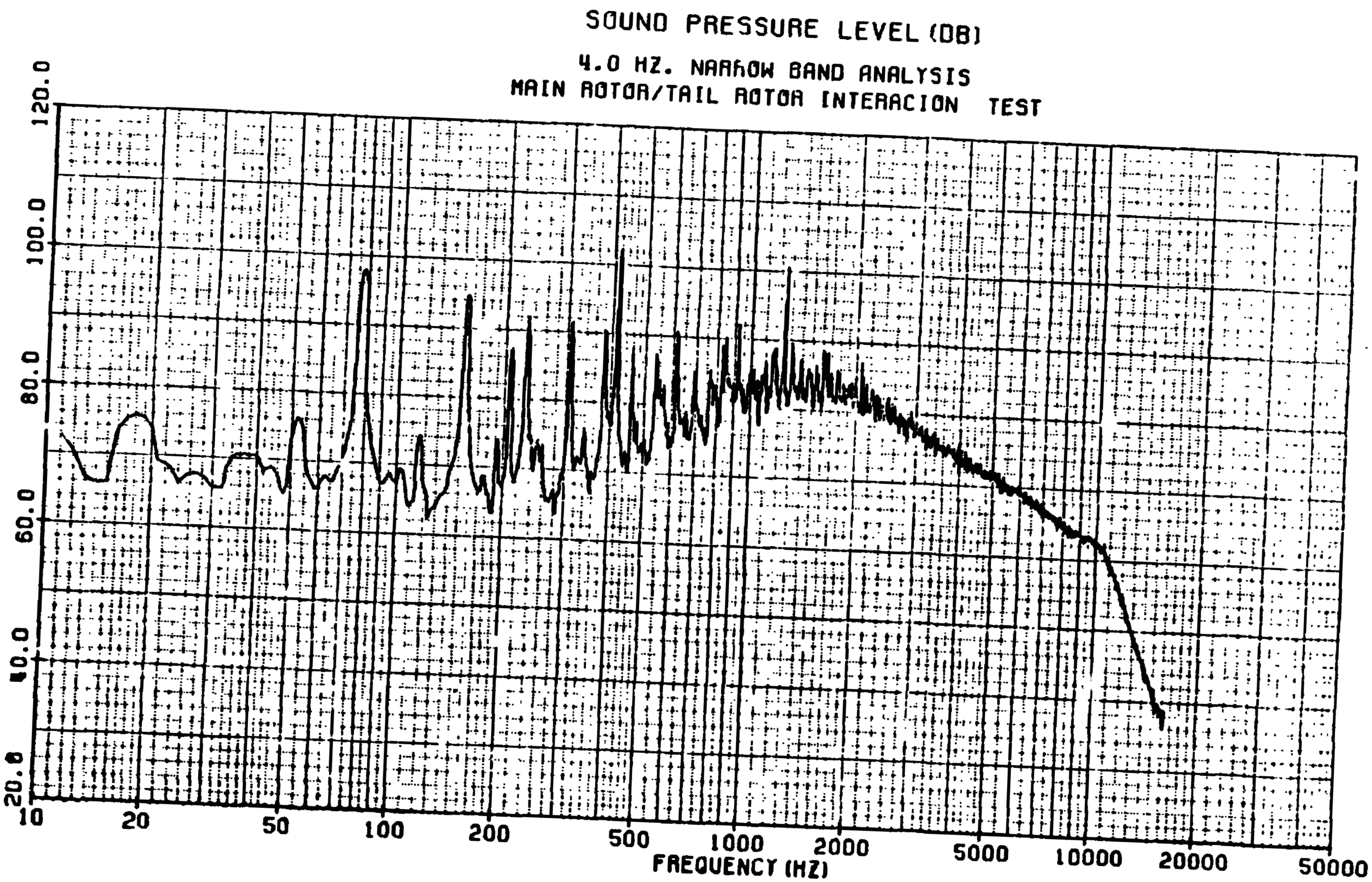
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



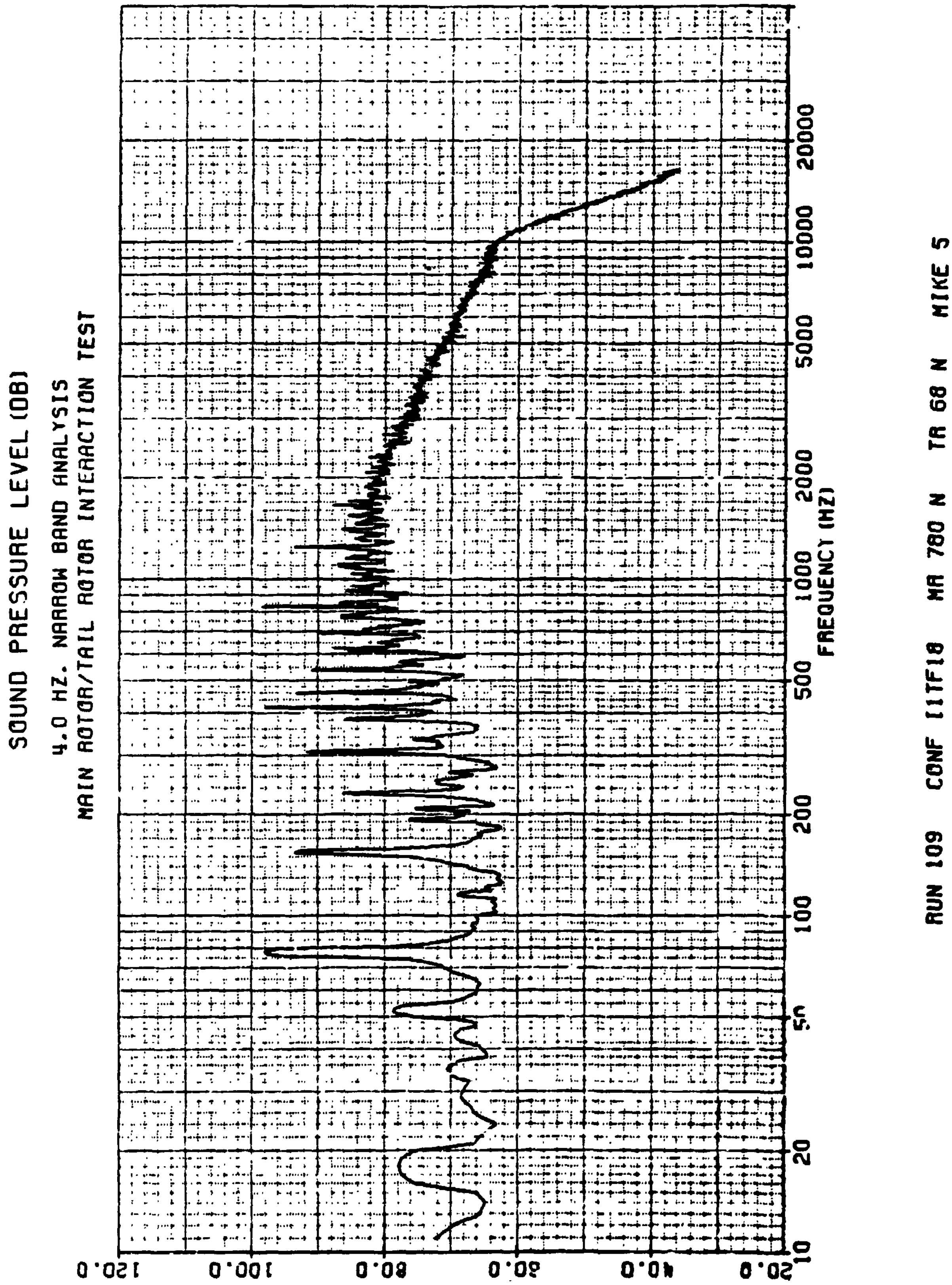
RUN 109 CONF 11TF18 MR 780 N TR 68 N MIKE 1

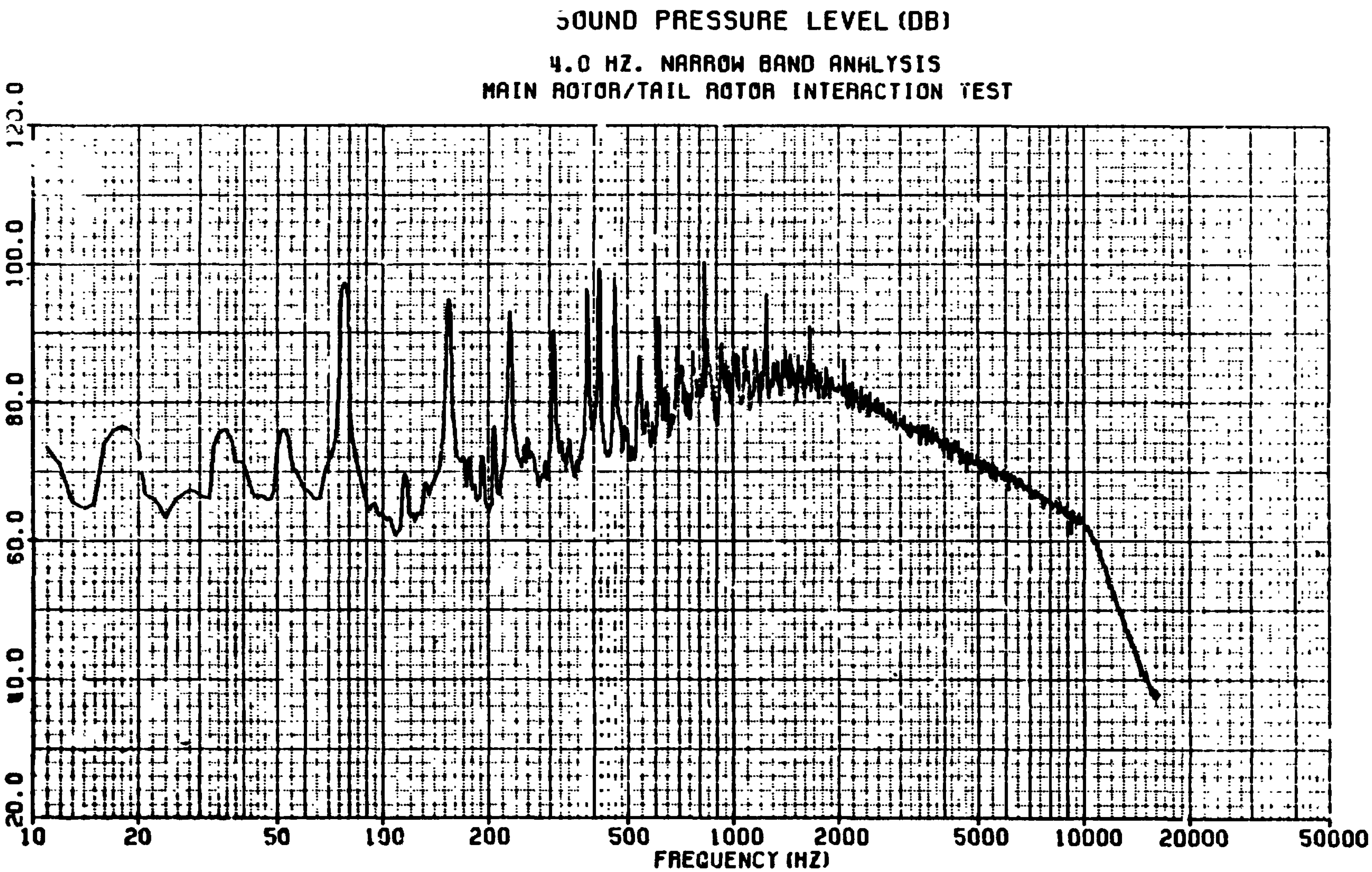
ORIGINAL PAGE IS
OF POOR QUALITY


SOUND PRESSURE LEVEL (DB)
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST
120.
100.0
80.0
60.0
40.0
20.0
10
20
50
100
200
500
1000
2000
5000
10000
20000
50000
FREQUENCY (HZ)
RUN 109 CONF 11TF18 MR 780 N TR 68 N MIKE 2



RUN 109 CONF I1TF18 MR 700 N TR 68 N MIKE 3


SOUND PRESSURE LEVEL (DB)
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST
120.0
100.0
80.0
60.0
40.0
20.0
10
20
50
100
200
500
1000
2000
5000
10000
20000
FREQUENCY (HZ)
RUN 109 CONF 11TF18 MR 780 N TR 68 N MIKE 5

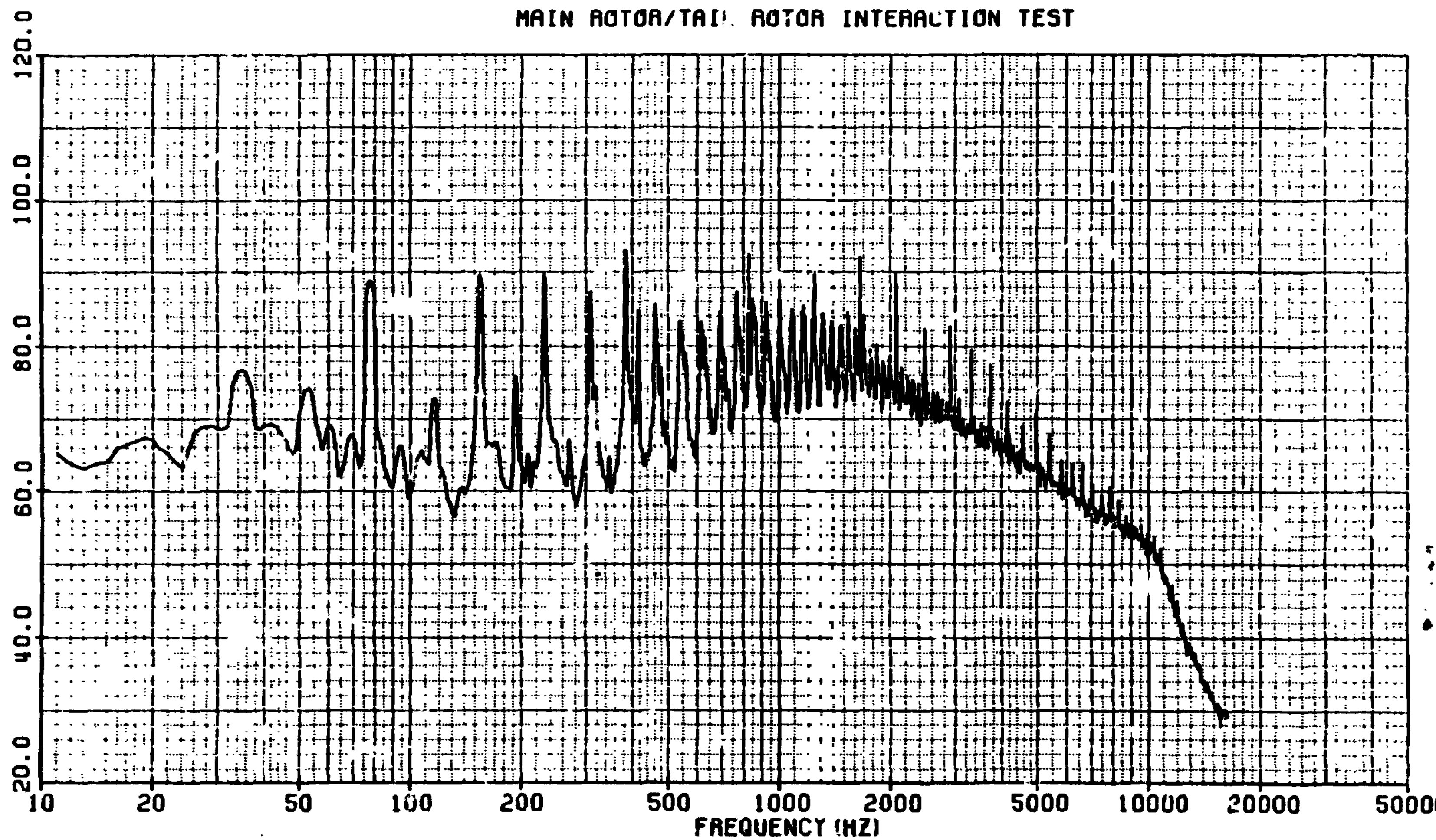


RUN 109 CONF I1TF18 MR 780 N TR 62 N MIKE 6

ORIGINAL PAGE IS OF POOR QUALITY

SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



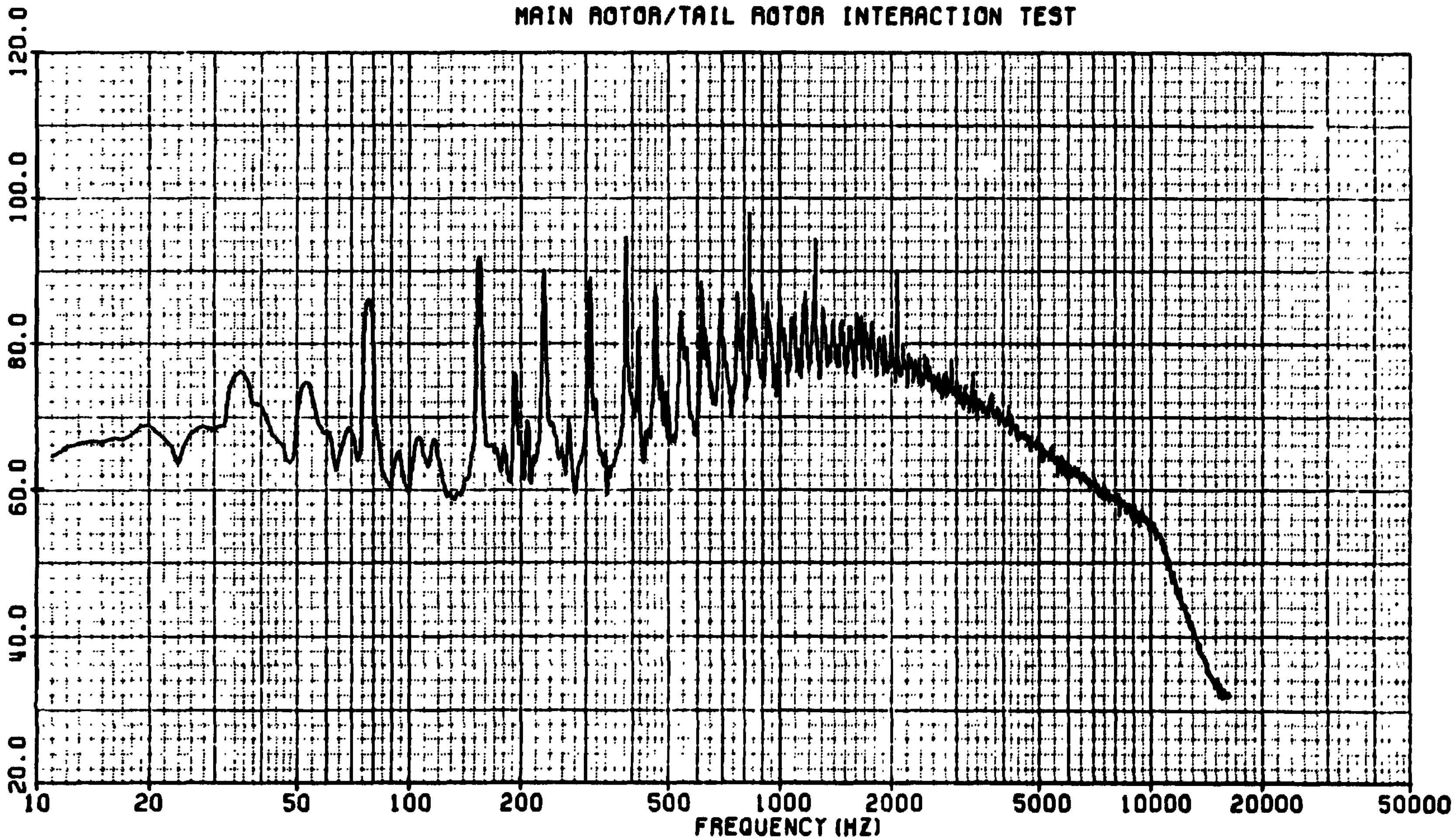
RUN 76 CONF I14PF18 MR 328 N TR 21 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY

SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS

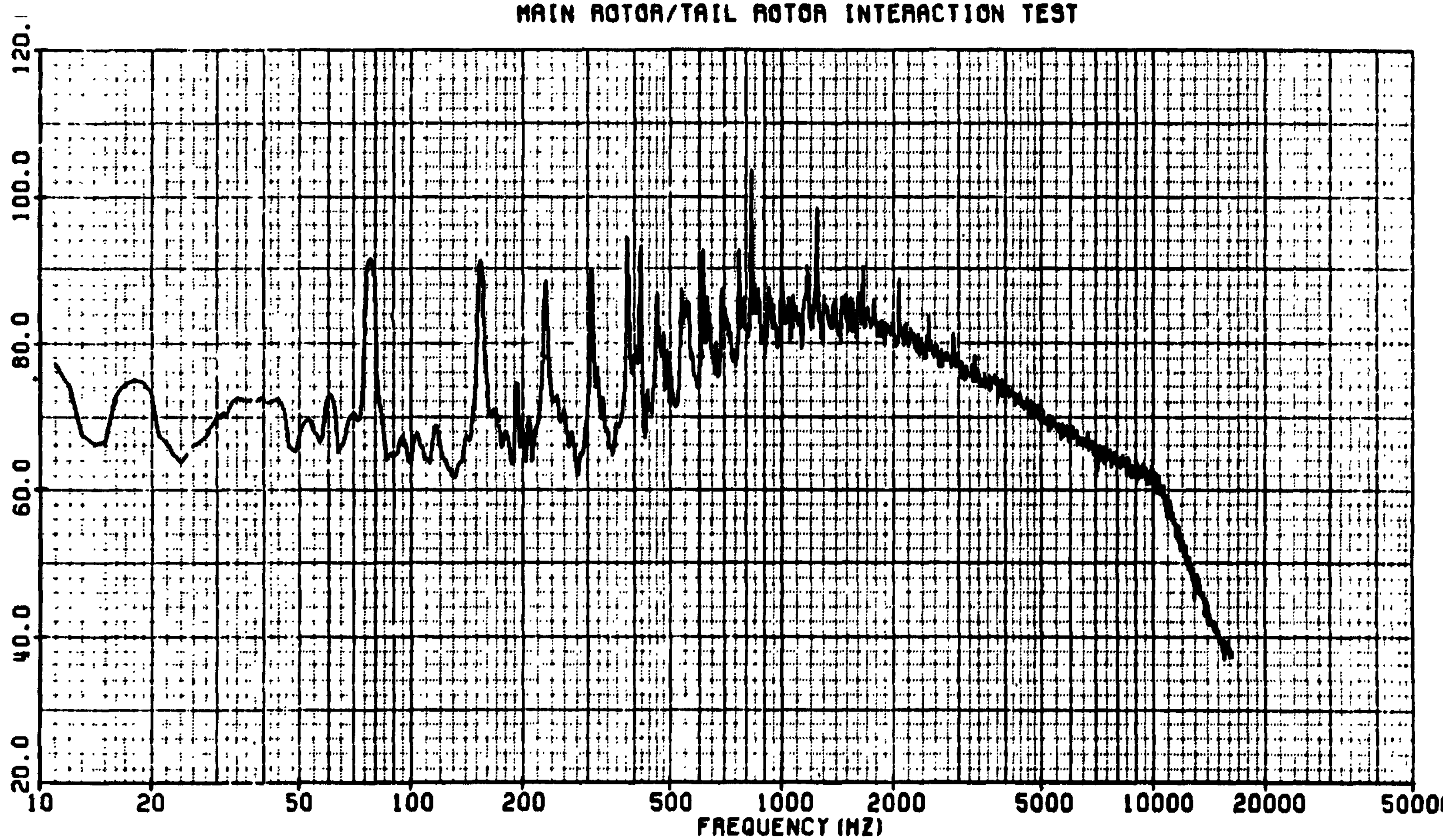
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 76 CONF I14PF18 MR 568 N TR 39 N MIKE 4

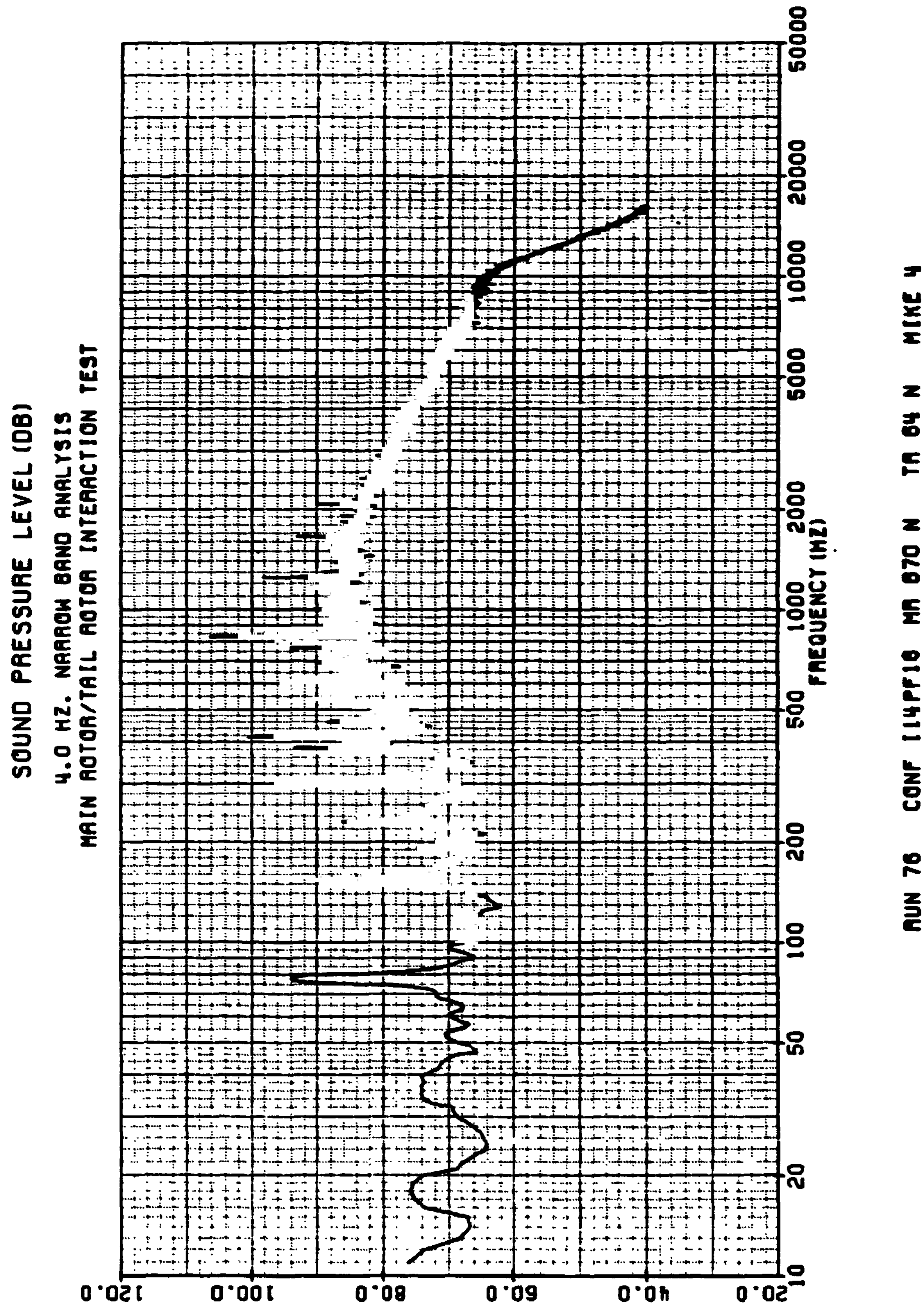
SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



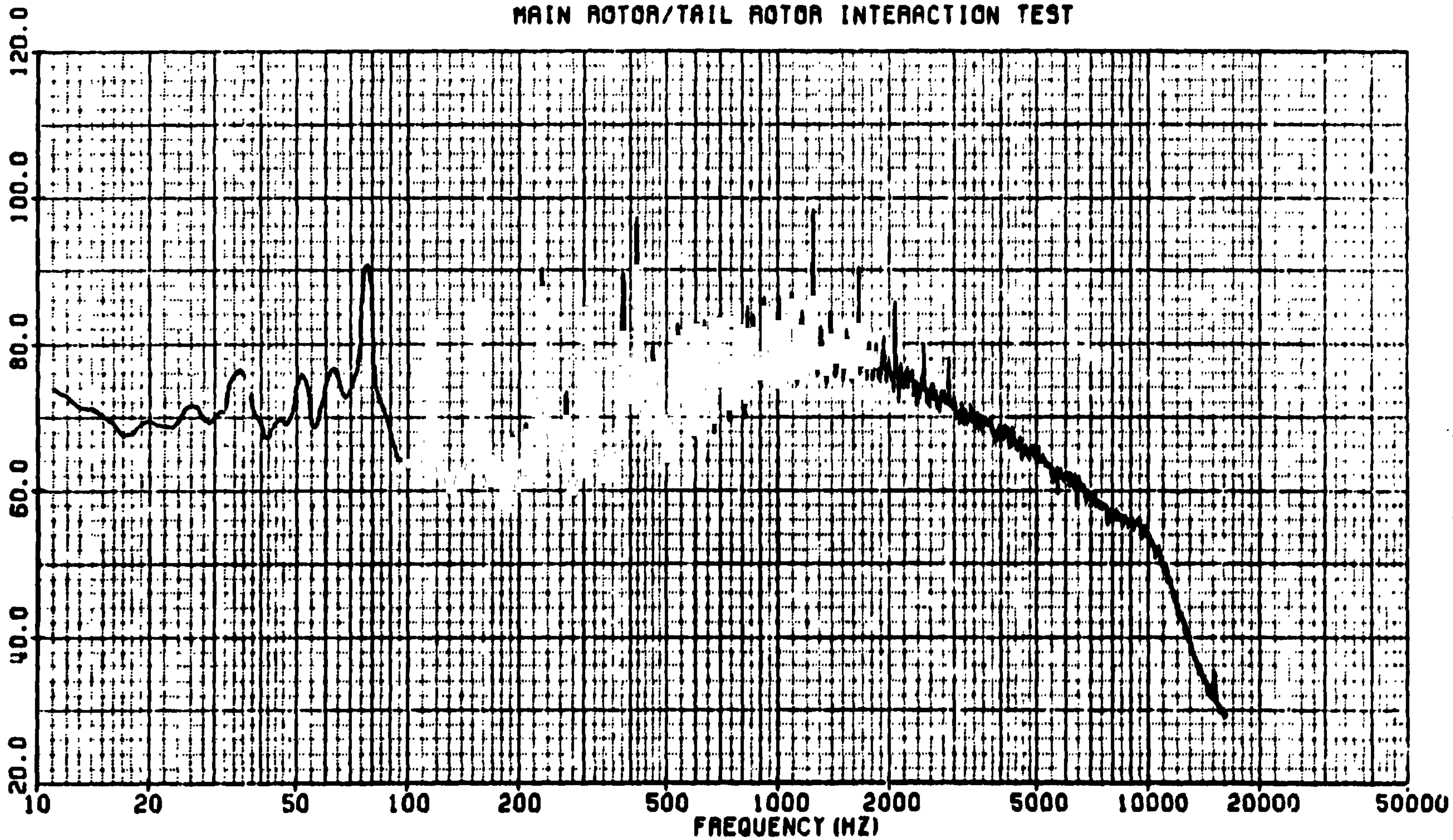
RUN 76   CONF I14PF18   MR 772 N   TR 52 N   MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY



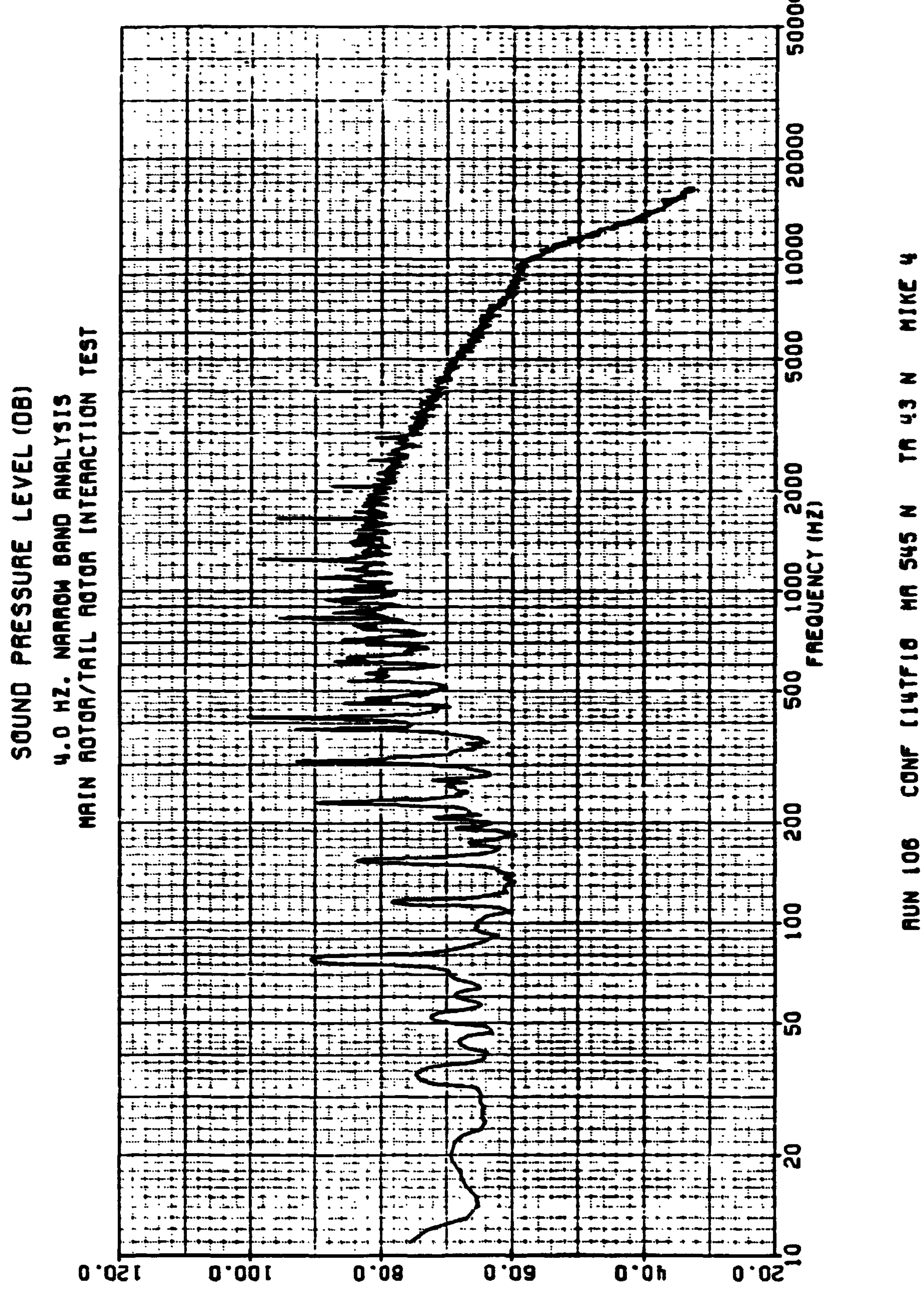
SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



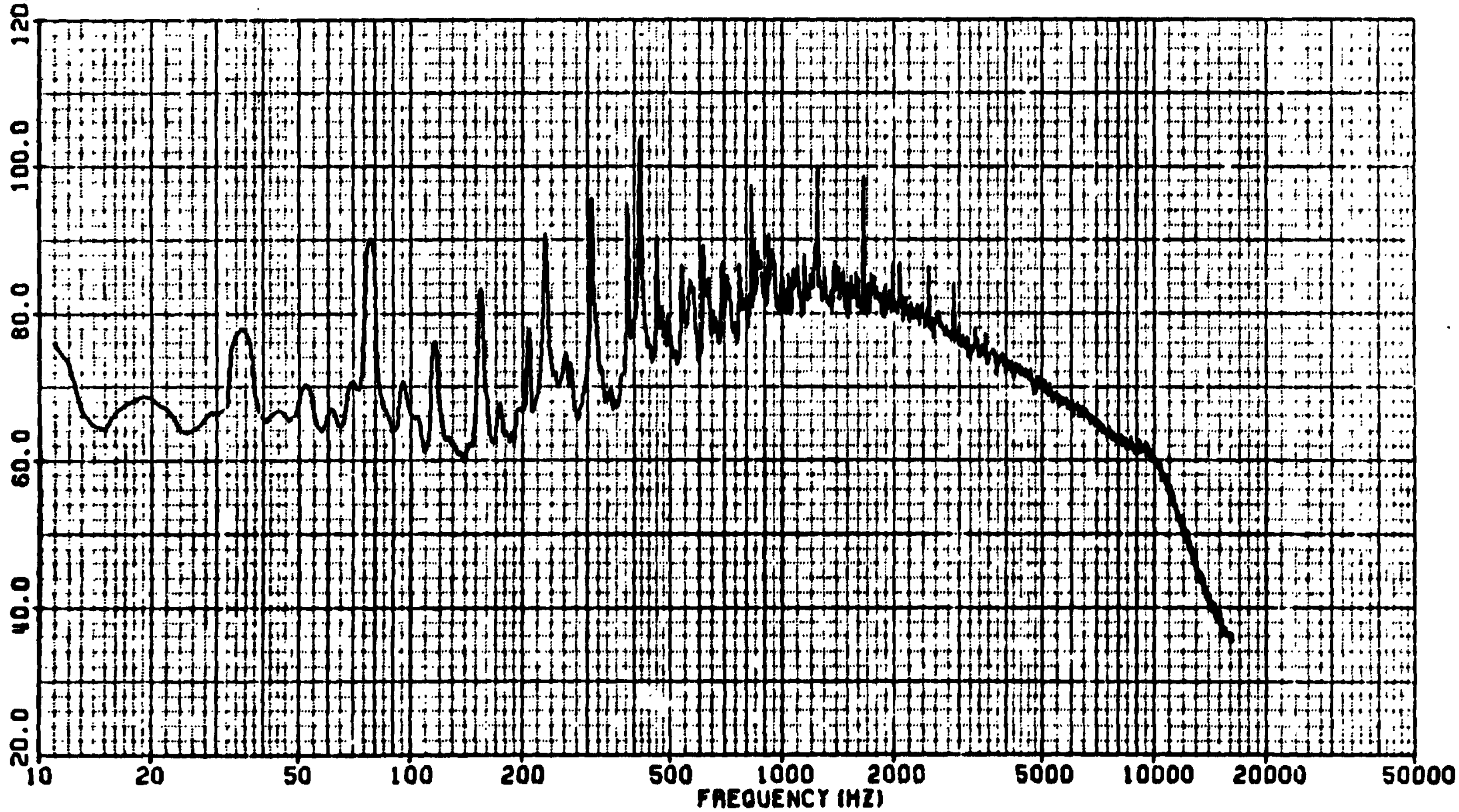
RUN 106 CONF I14TF18 MR 309 N TR 26 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY



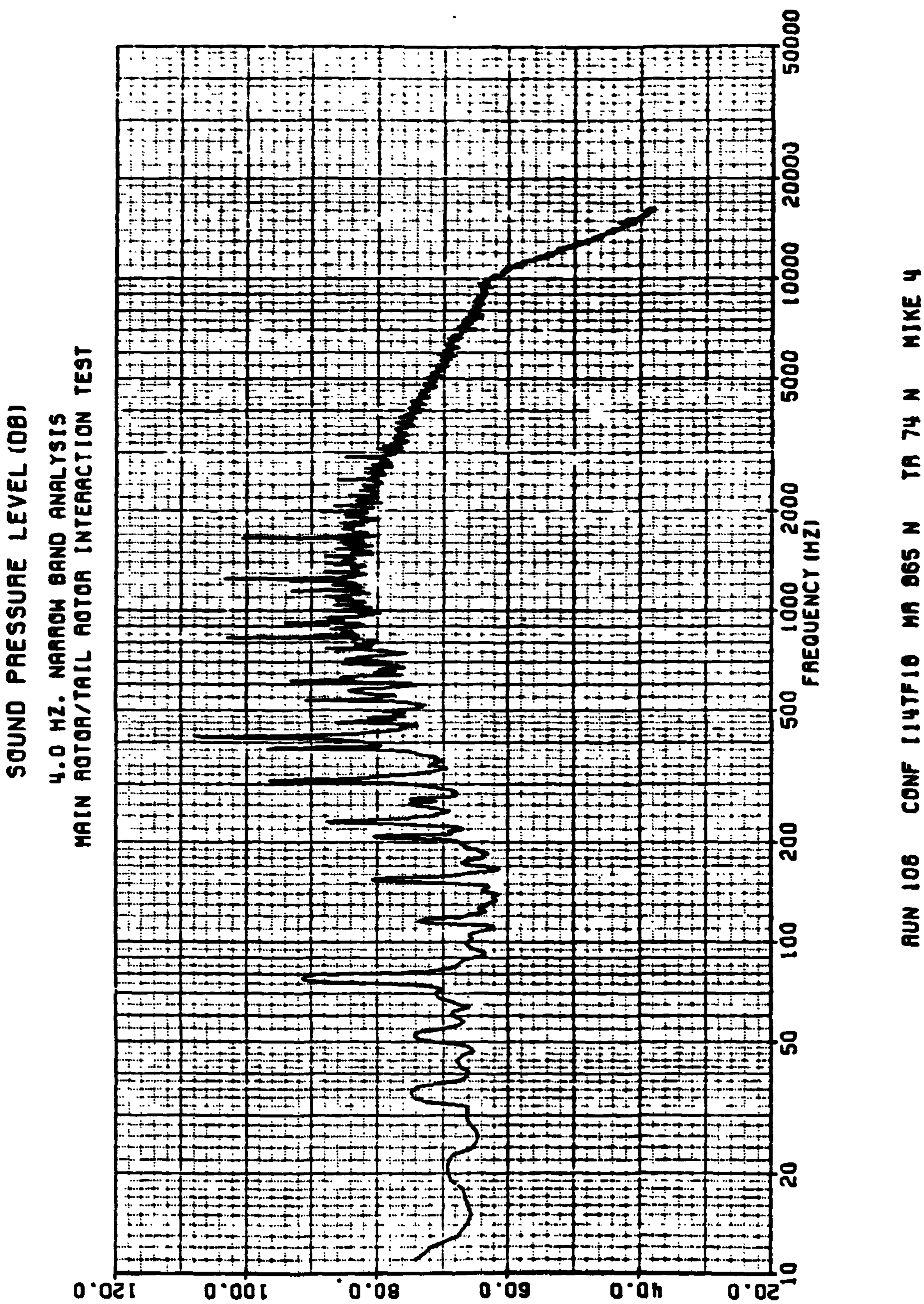
SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST

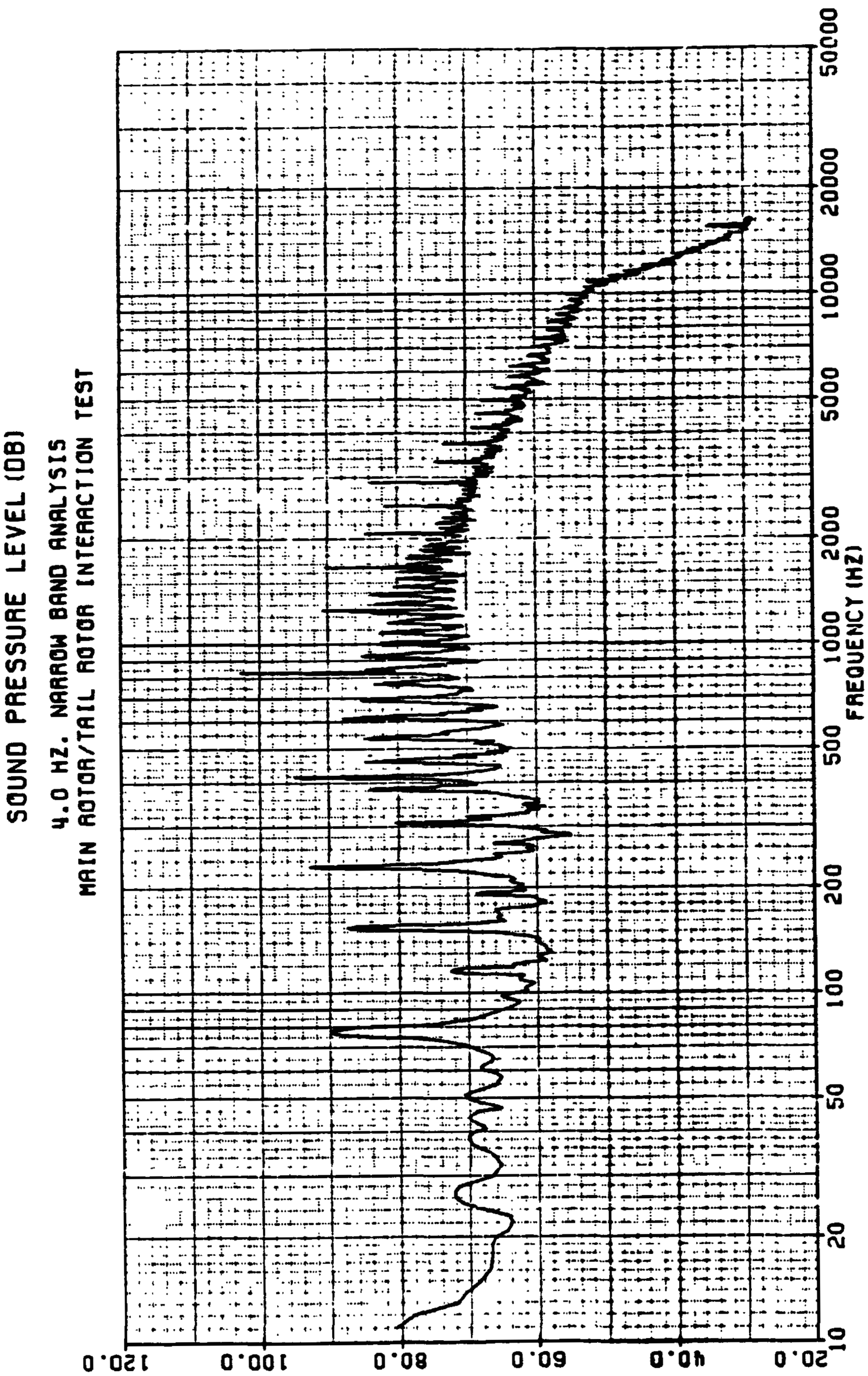


RUN 106 CONF I14TF18 MR 750 N TR 63 " MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY



ORIGINAL PAGE IS OF POOR QUALITY



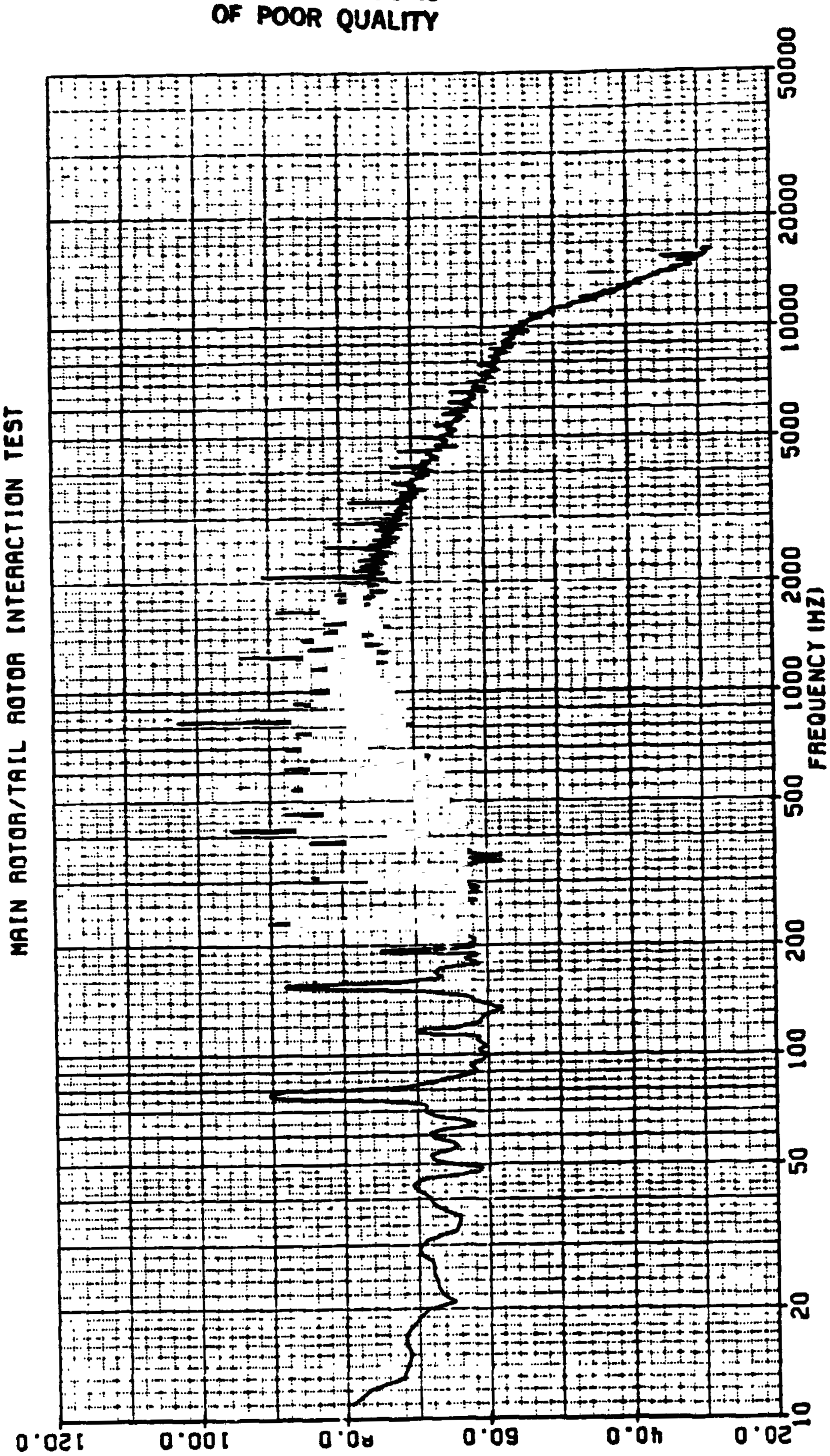
RUN 84 CONF 12PF18 MR 326 N TR 21 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY

SOUND PRESSURE LEVEL (DB)

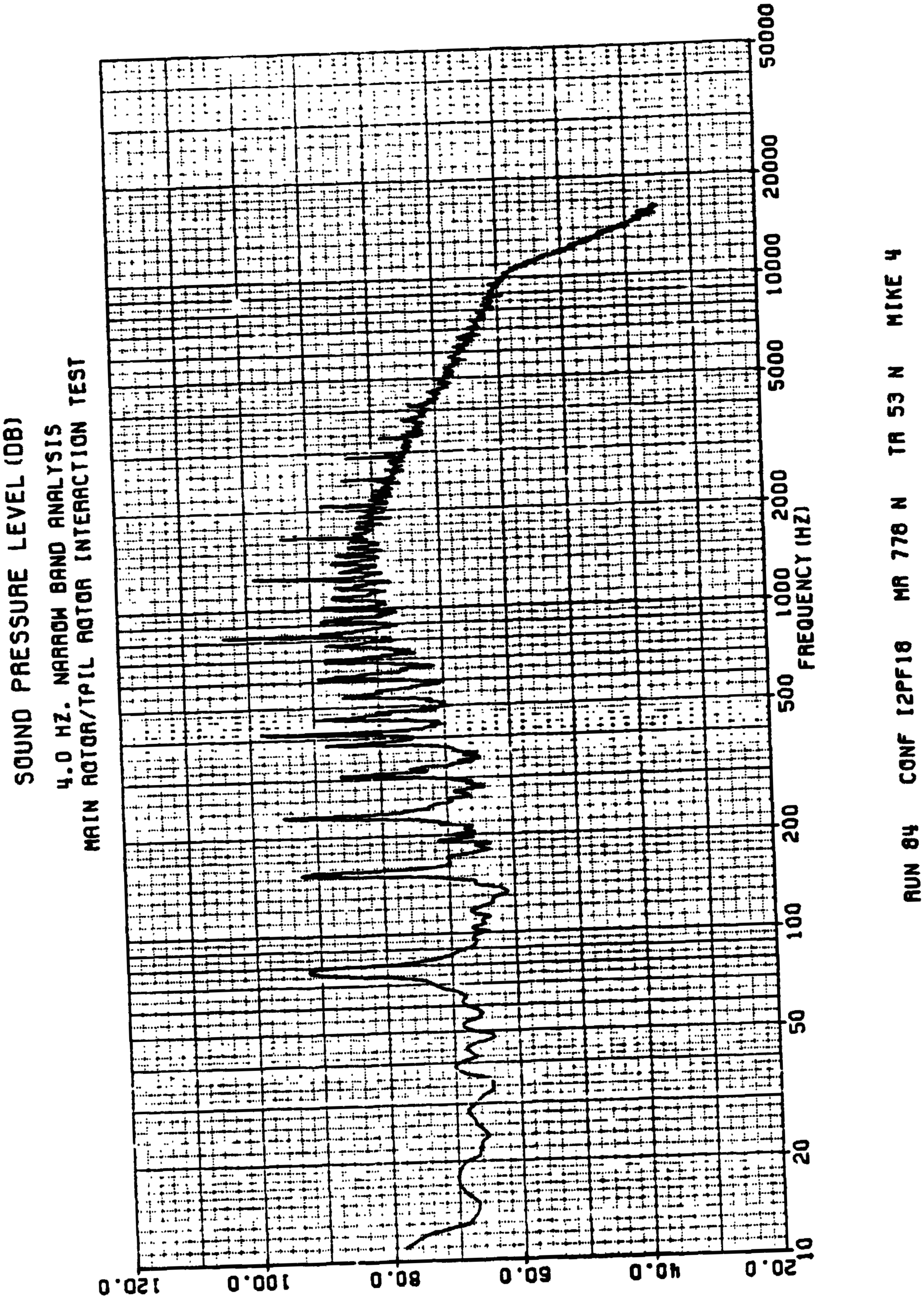
4.0 HZ. NARROW BAND ANALYSIS

MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 84 CONF 12PF18 MR 561 N TR 34 N MIKE 4

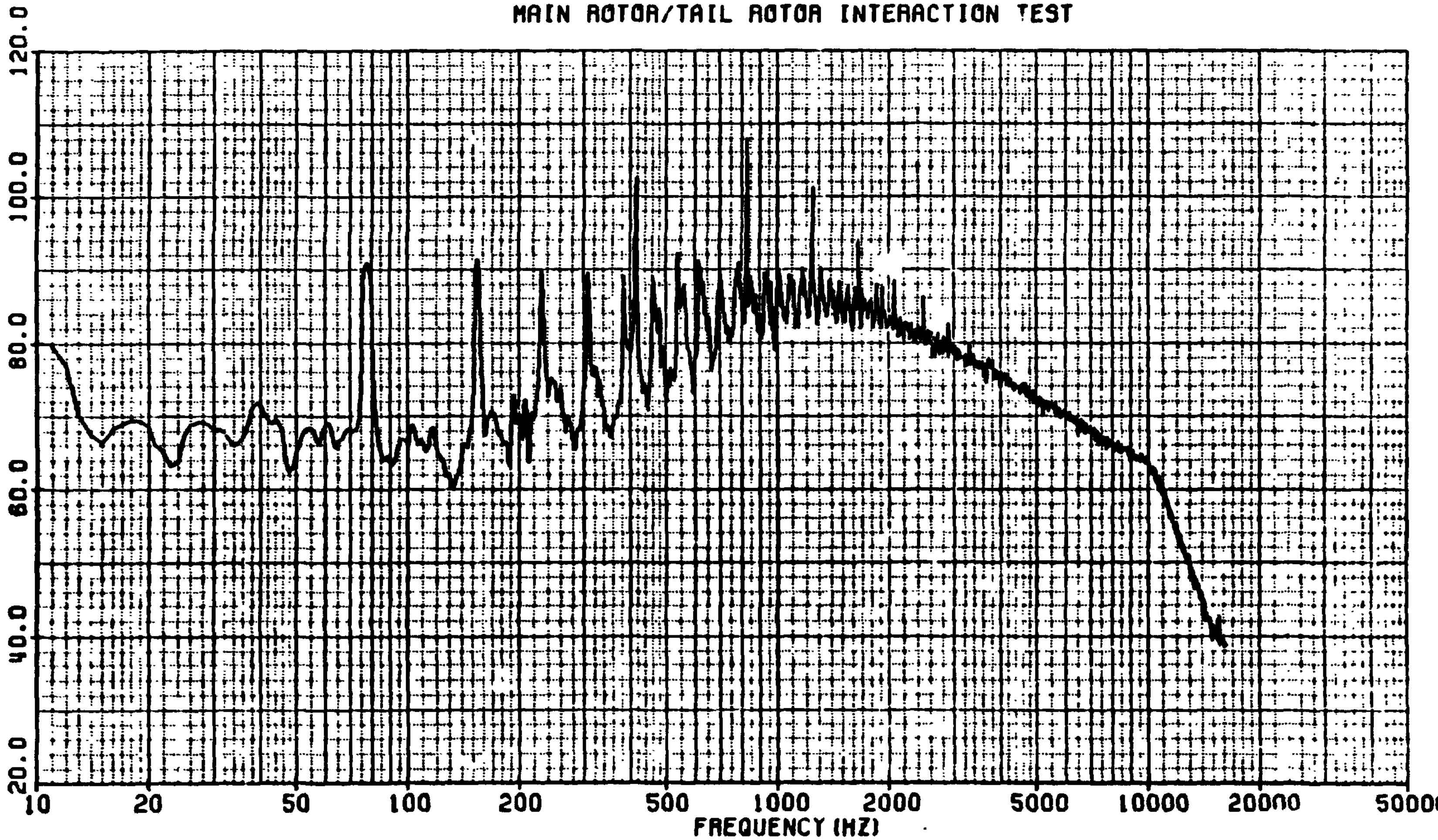
ORIGINAL PAGE IS
OF POOR QUALITY



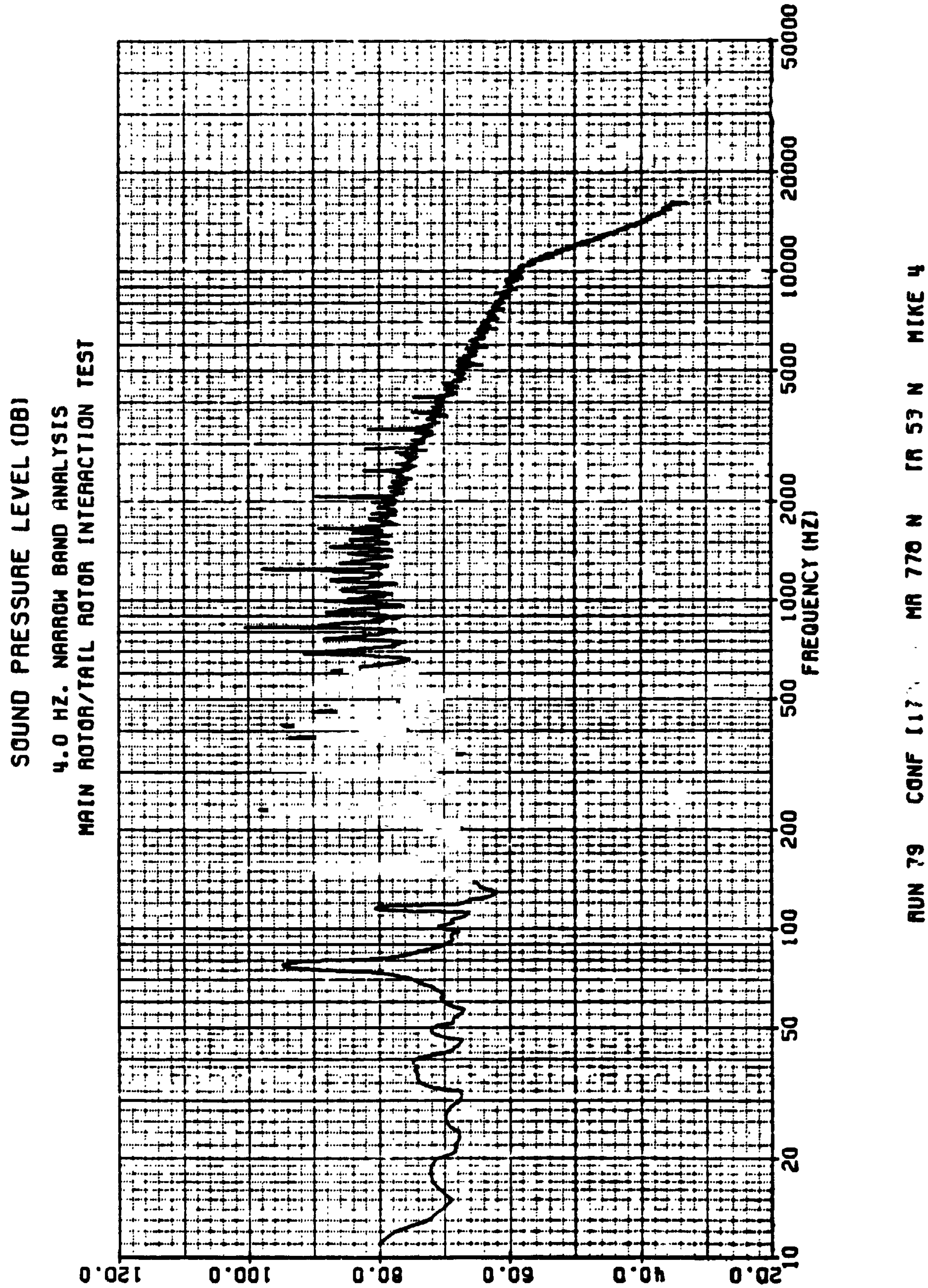
ORIGINAL PAGE IS
OF POOR QUALITY

SOUND PRESSURE LEVEL (DB)

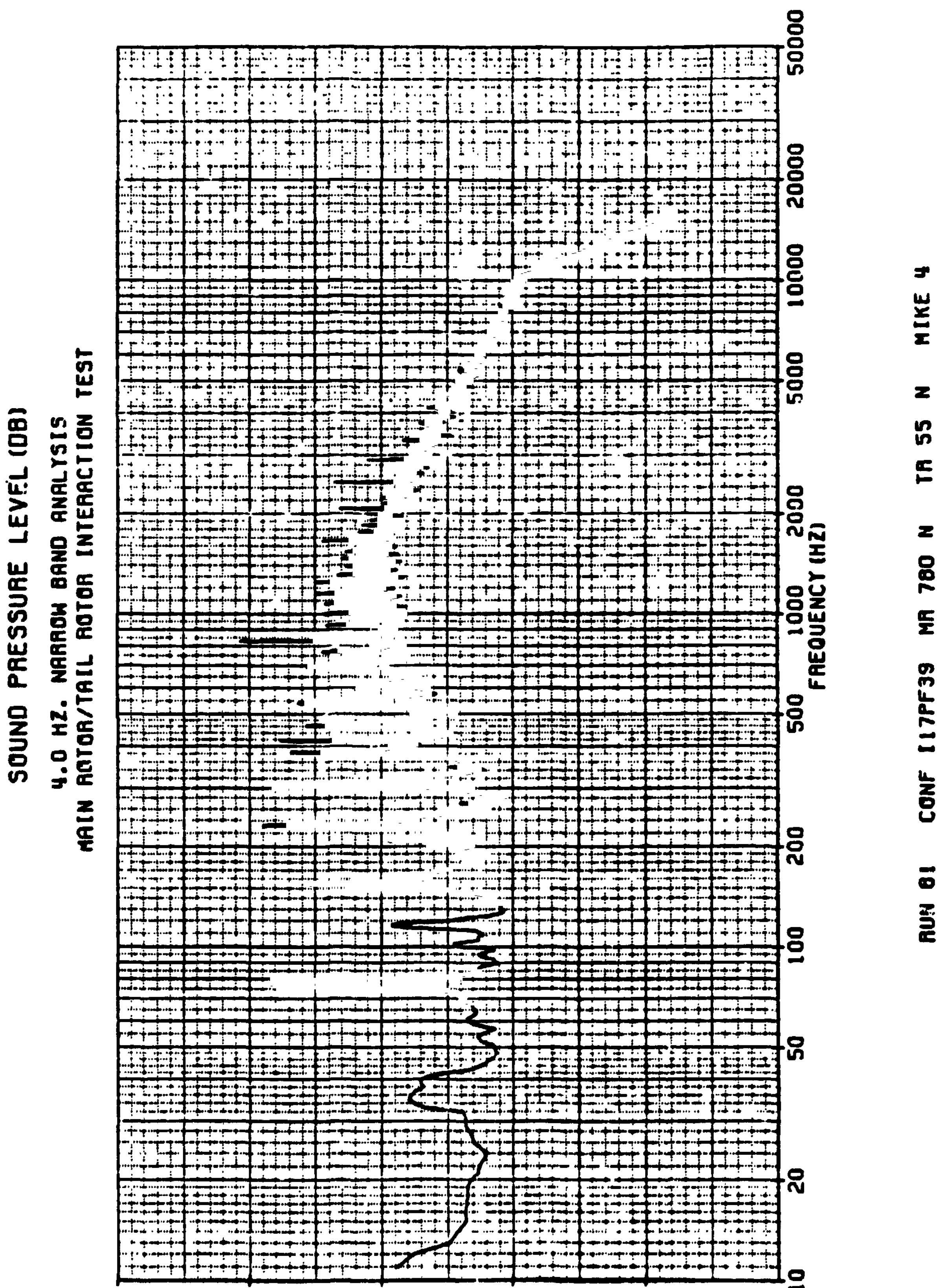
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 84   CONF I2PF18   MR 869 N   TR 61 N   MIKE 4

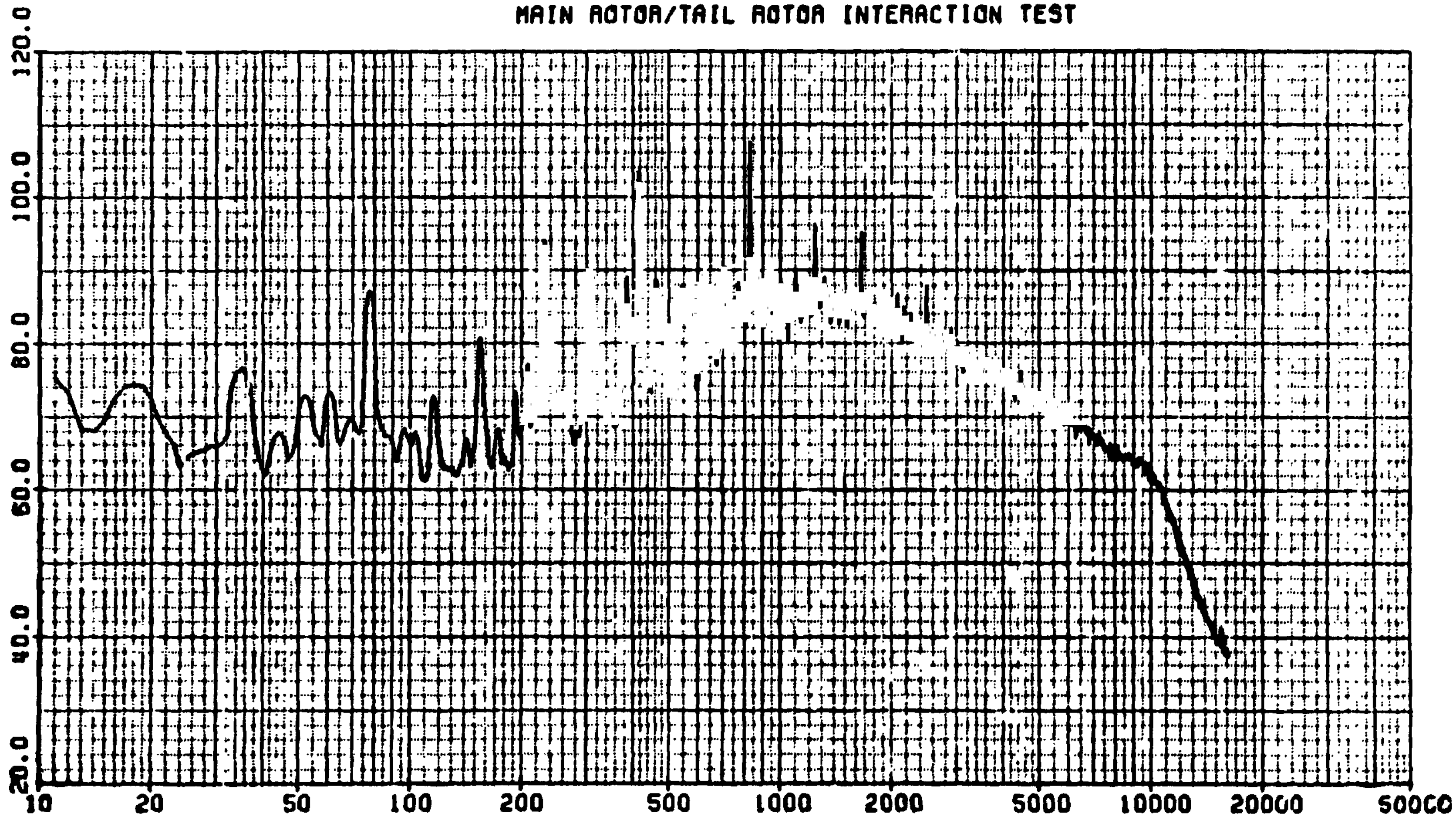

SOUND PRESSURE LEVEL (DB)
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST
120.0
100.0
80.0
60.0
40.0
20.0
10
20
50
100
200
500
1000
2000
5000
10000
20000
50000
FREQUENCY (HZ)
RUN 79
TR 53 N
MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY



SOUND PRESSURE LEVEL (DB)

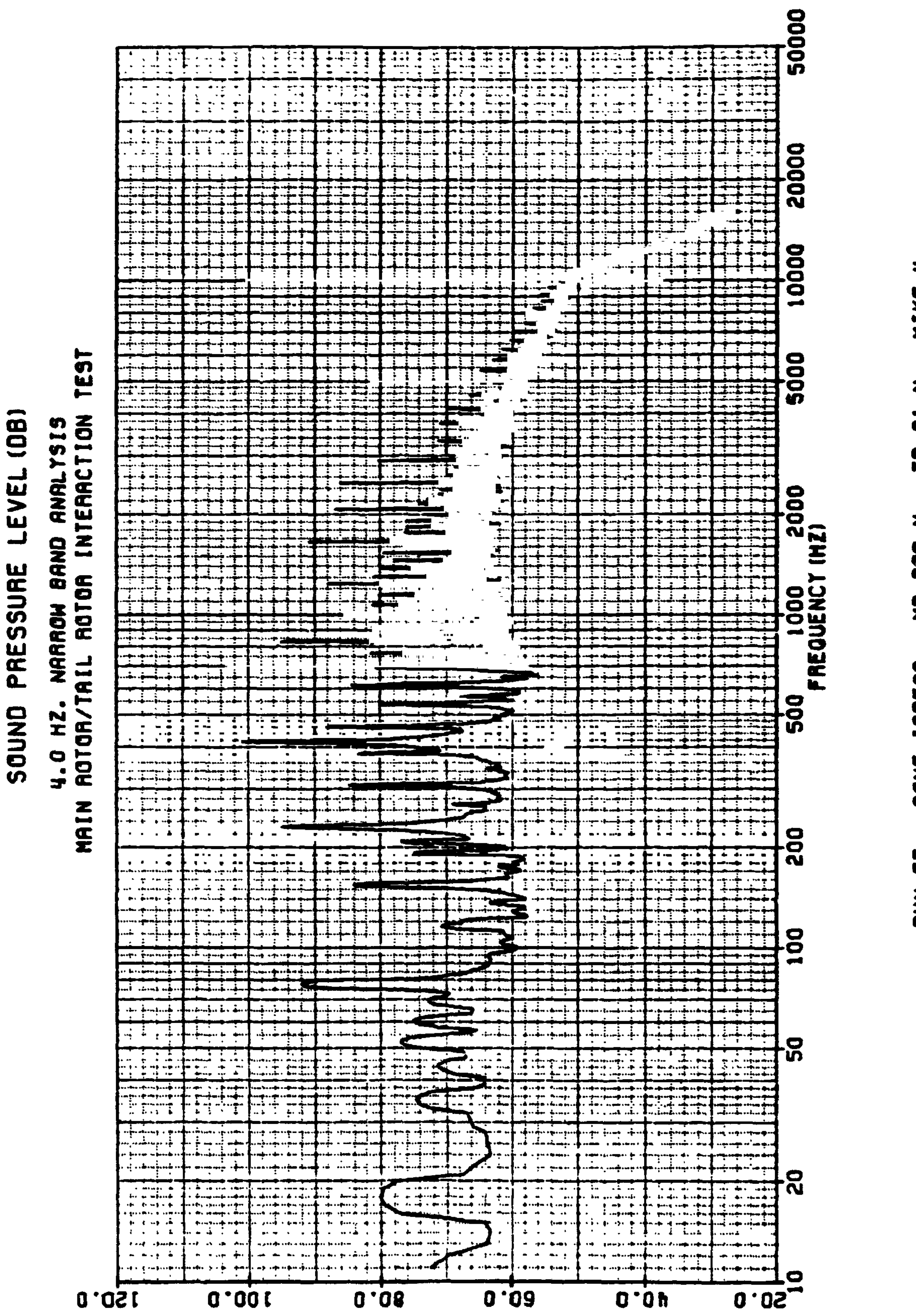
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



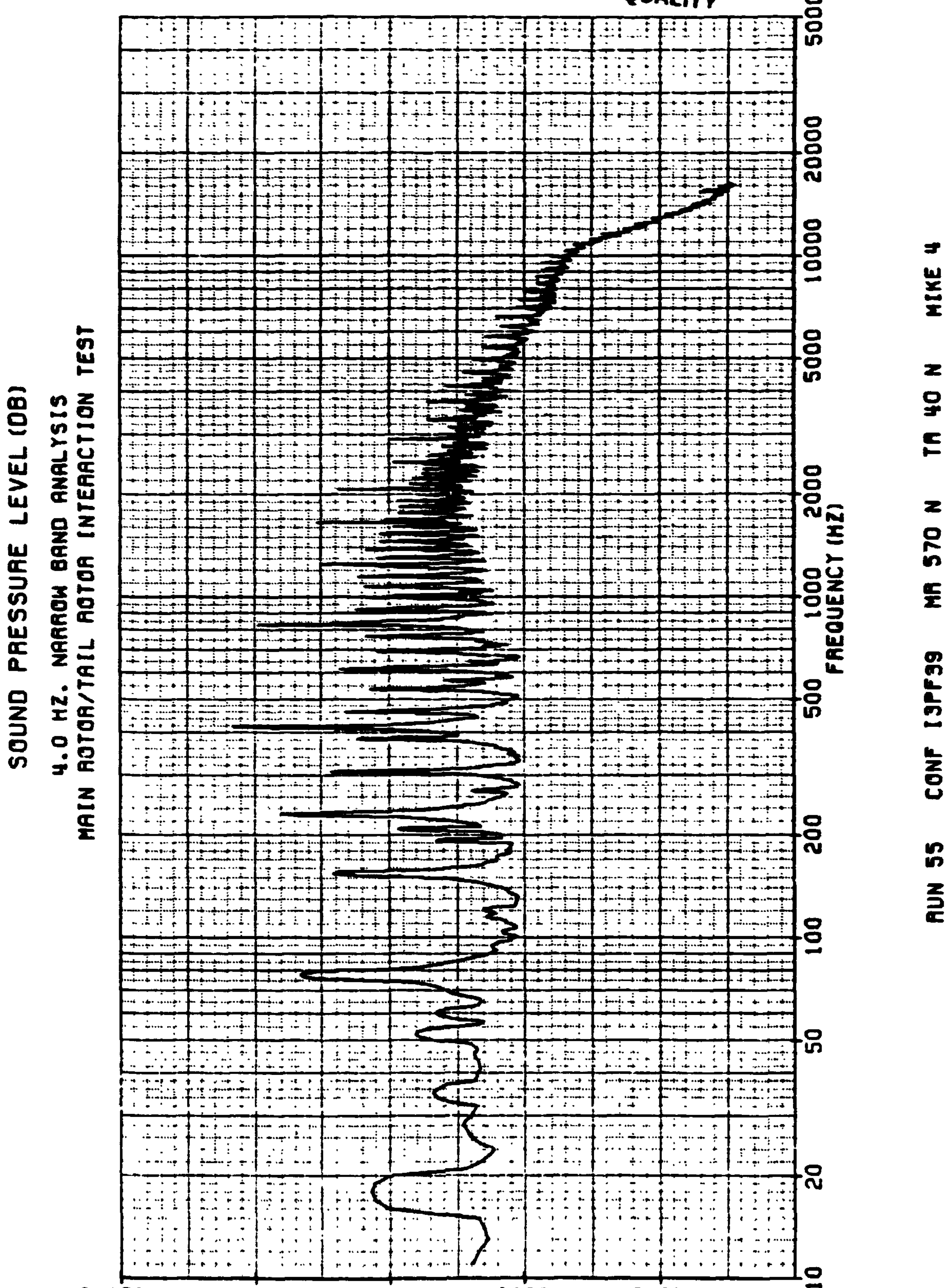
RUN 104 CONF I17TF18 MR 765 N TR 66 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY

ORIGINAL PAGE IS OF POOR QUALITY

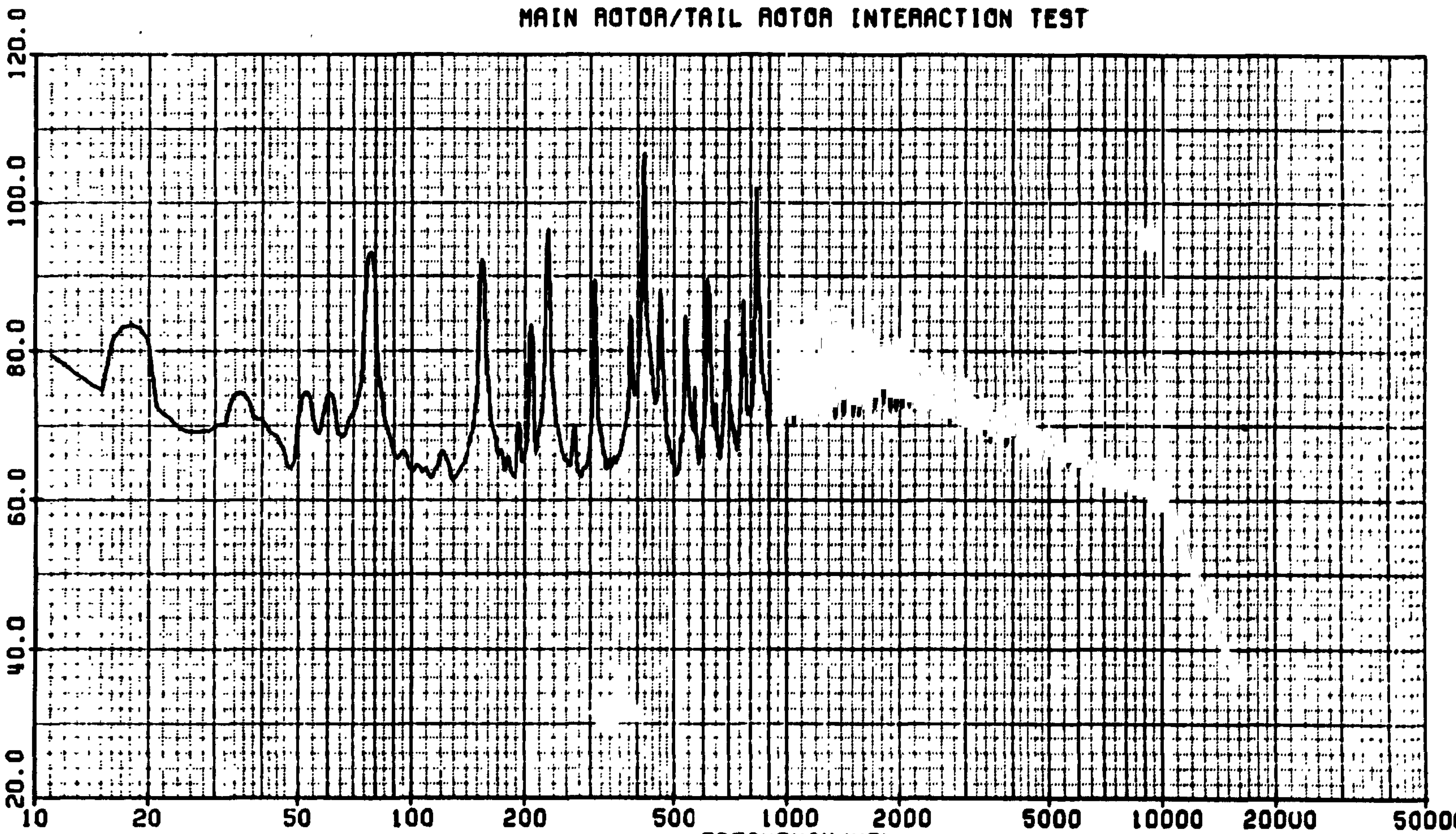


ORIGINAL PAGE IS
OF POOR QUALITY



SOUND PRESSURE LEVEL (DB)

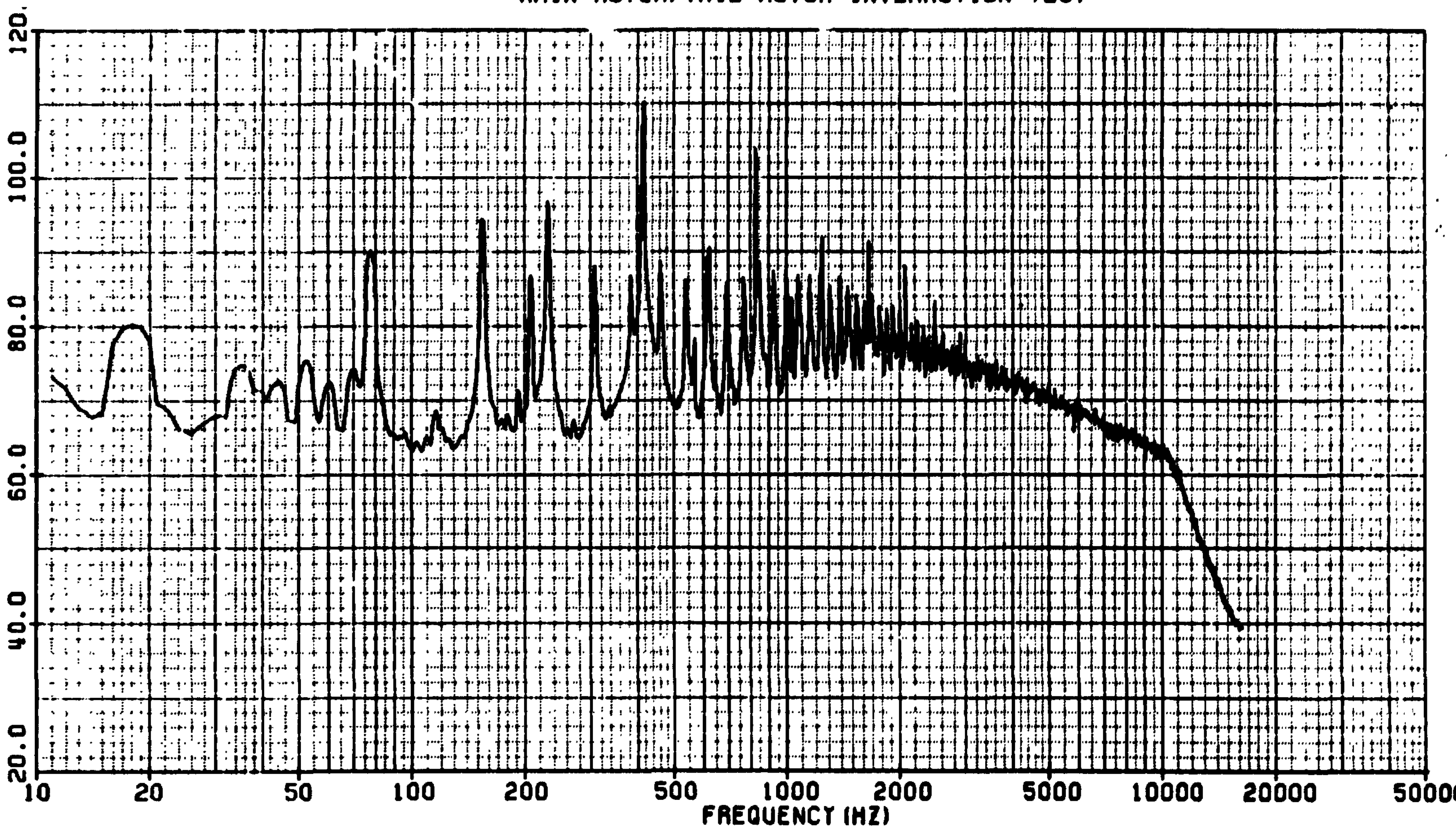
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 55 CONF 13PF39 MR 780 N TR. 52 N MIKE 4

SOUND PRESSURE LEVEL (DB)

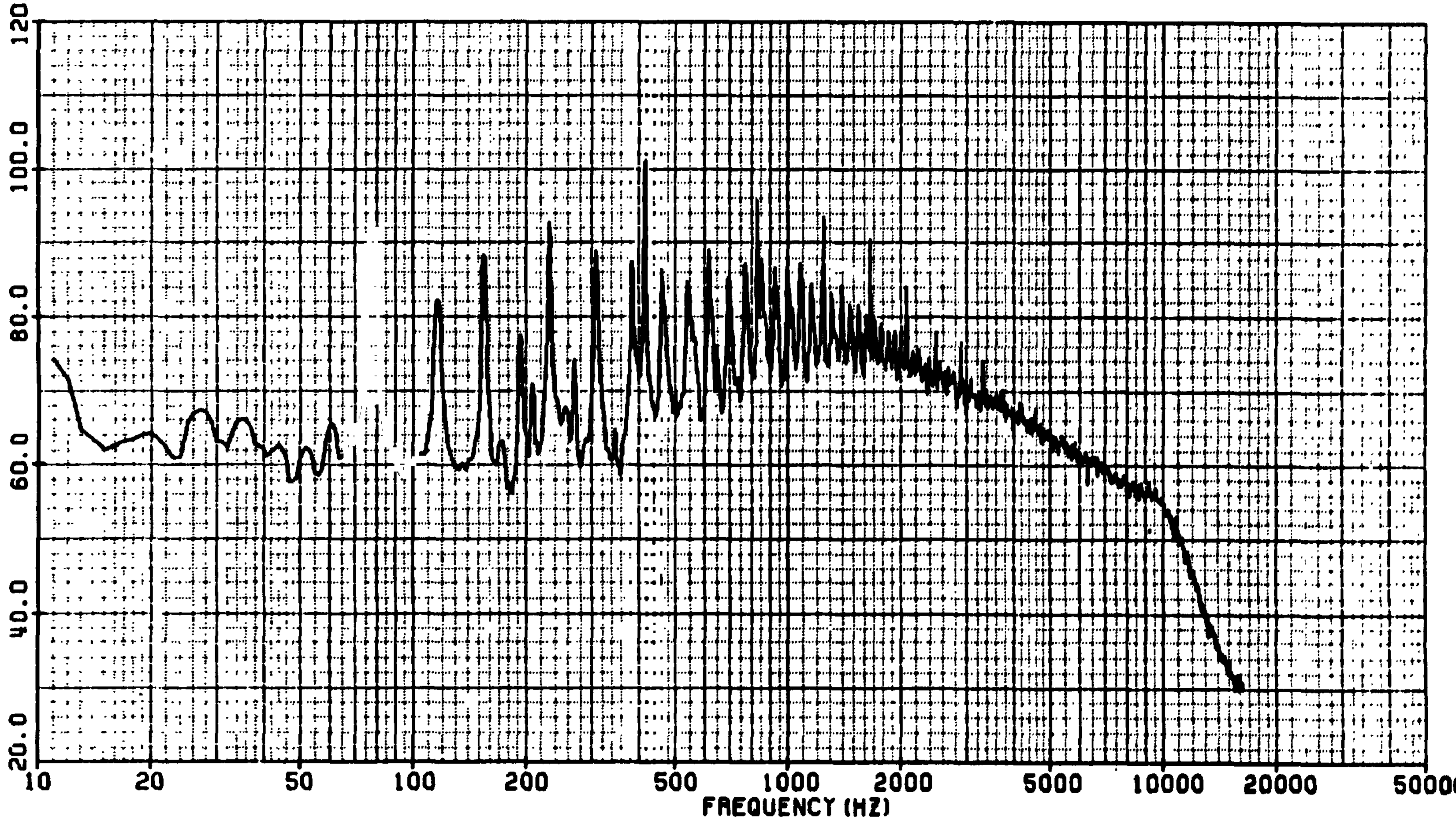
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



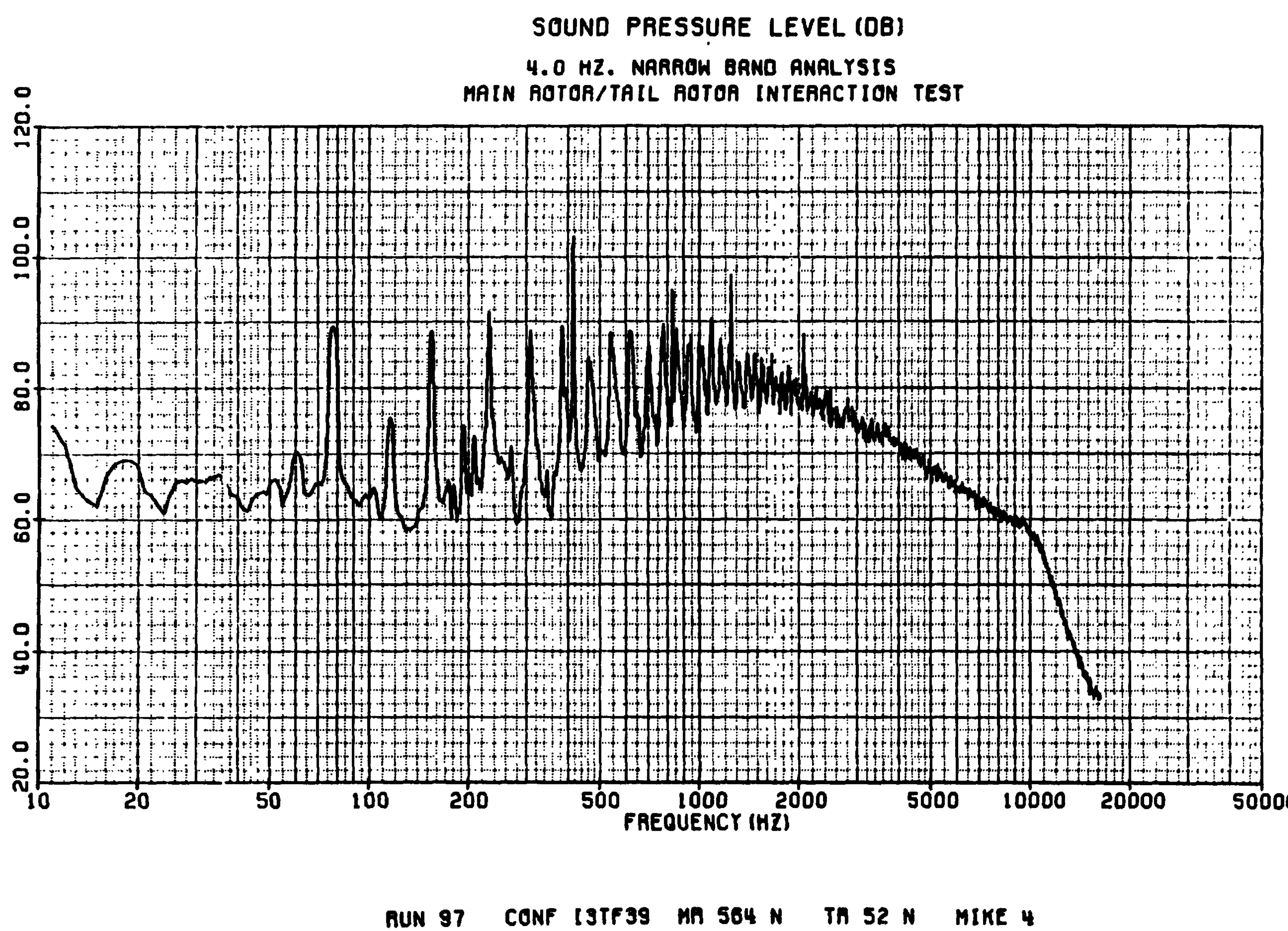
RUN 55 CONF I3PF39 MR 880 N TR 65 N MIKE 4

SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST

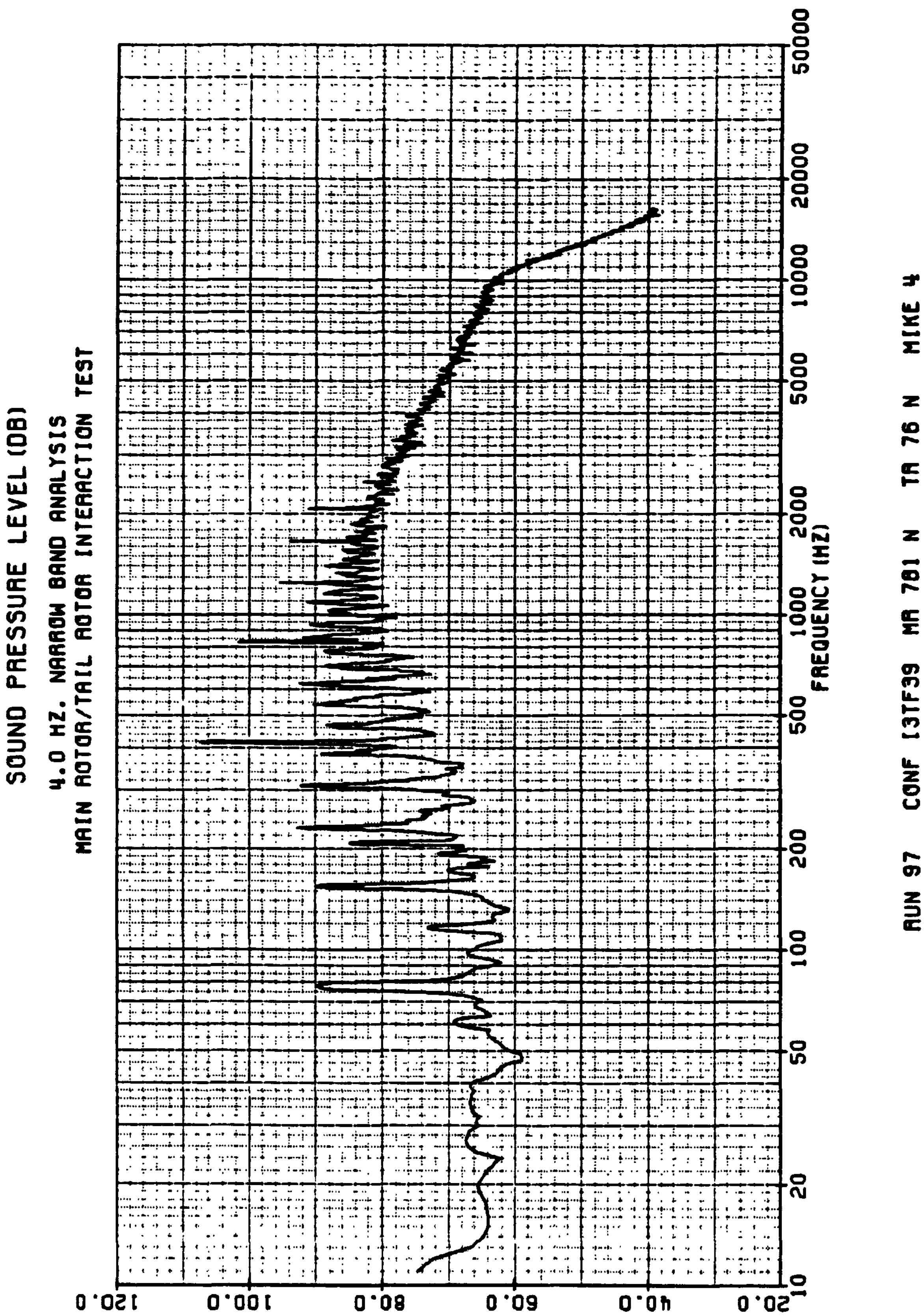


RUN 97 CONF I3TF39 MR 338 N TR 31 N MIKE 4

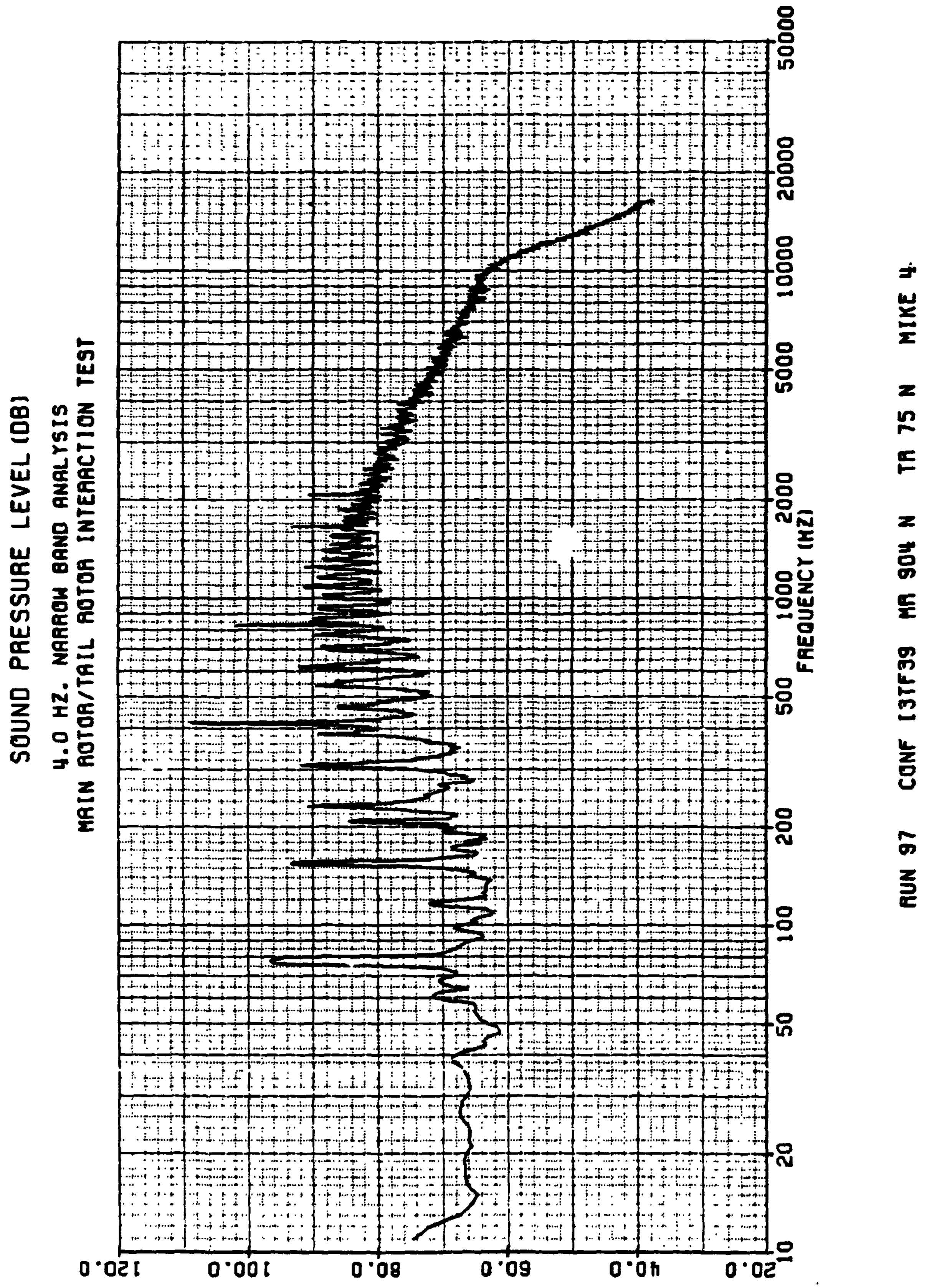


ORIGINAL PAGE IS OF POOR QUALITY

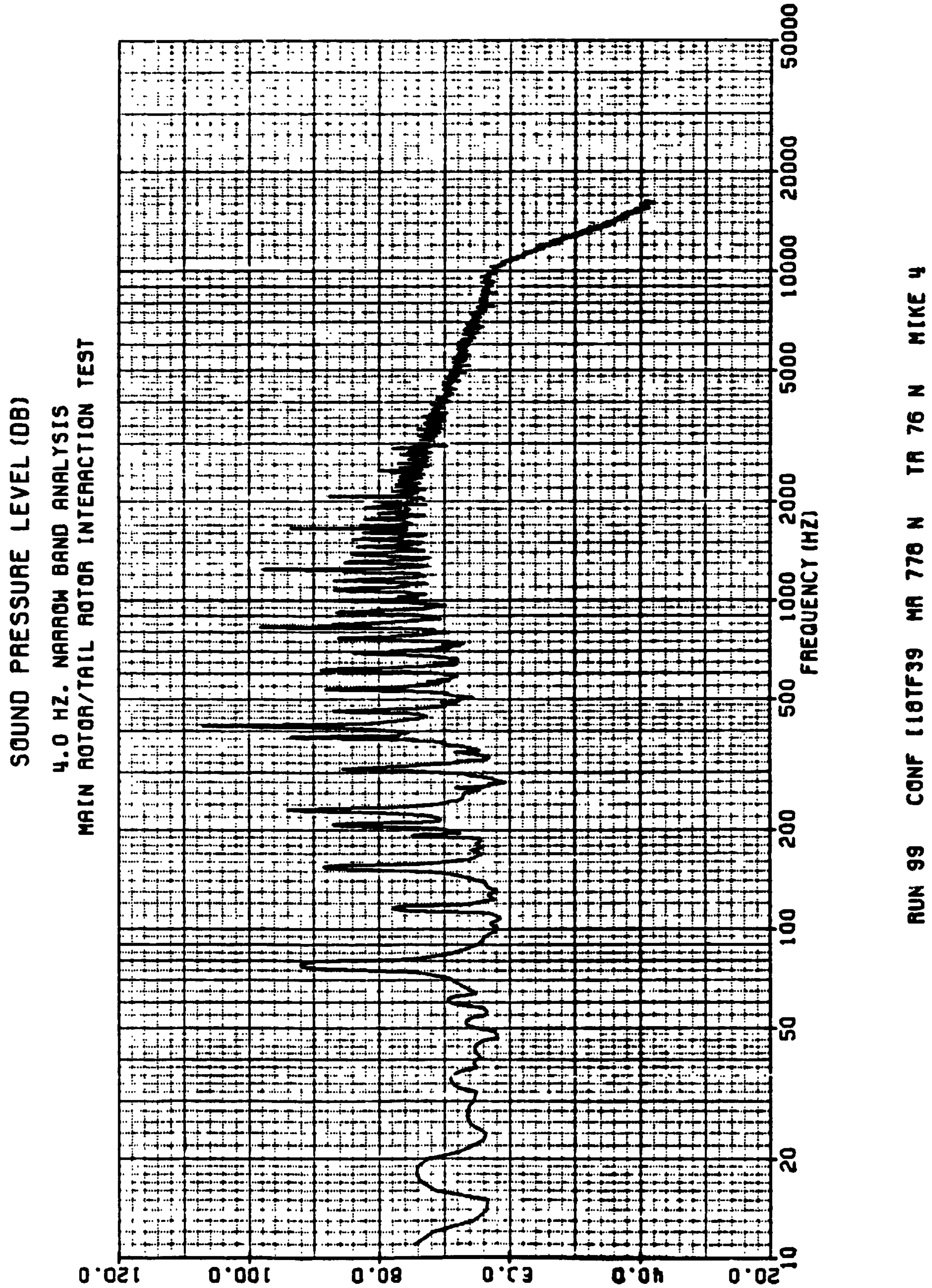
ORIGINAL PAGE IS OF POOR QUALITY



ORIGINAL PAGE IS
OF POOR QUALITY

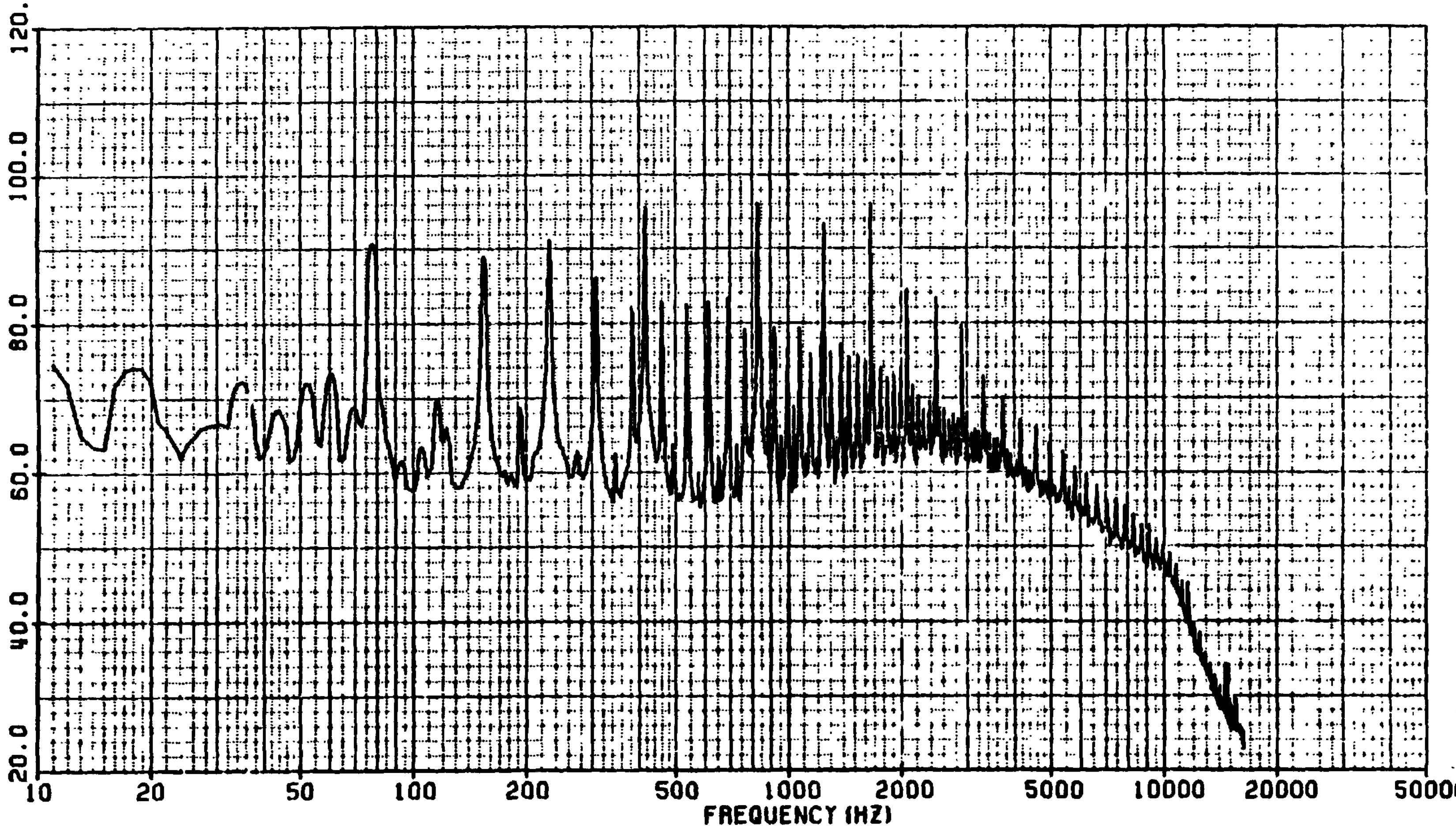


ORIGINAL PAGE IS
OF POOR QUALITY



SOUND PRESSURE LEVEL (DB)

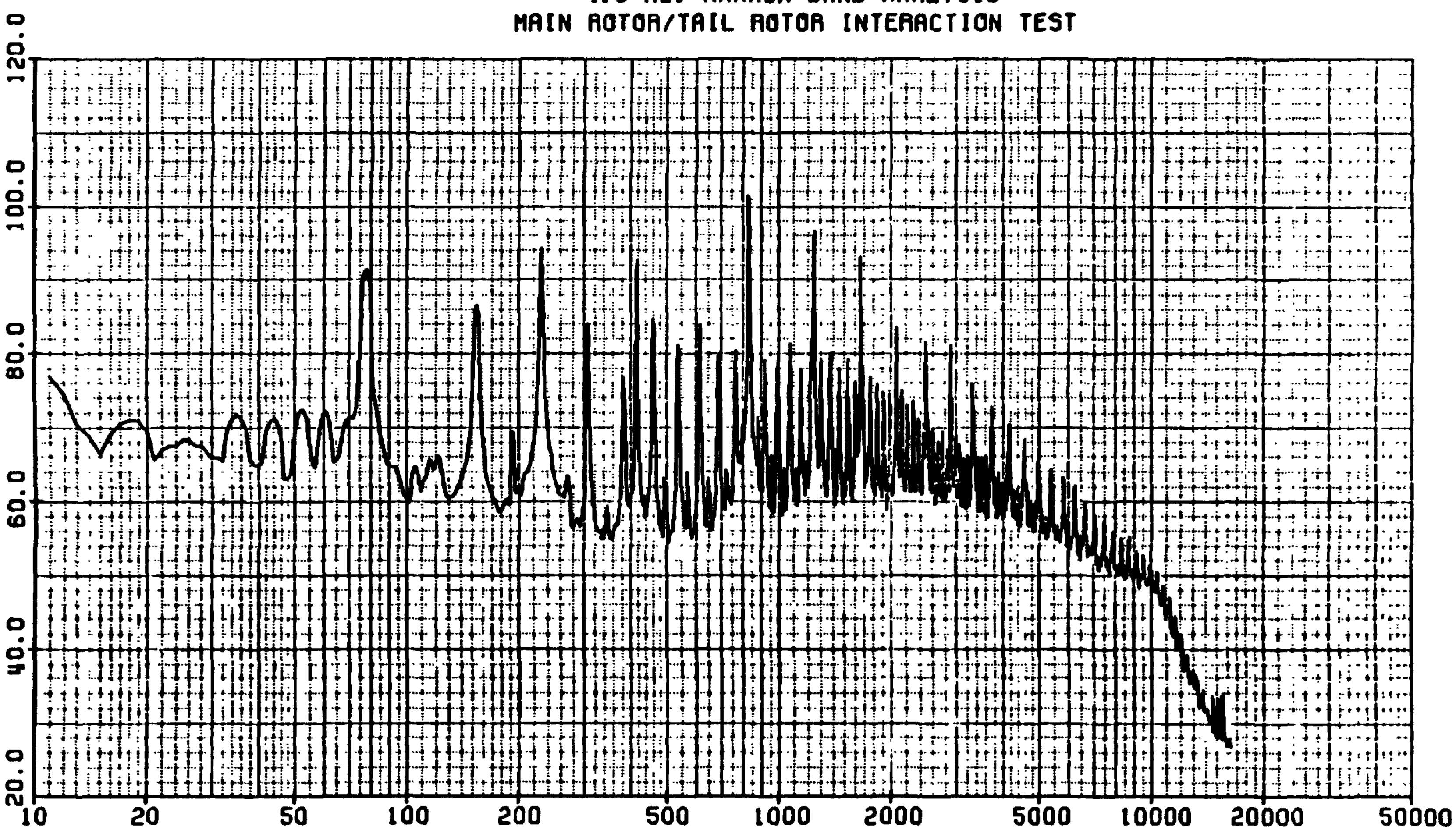
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 67 CONF I4PF39 MR 301 N TR 21 N MIKE 4

SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST

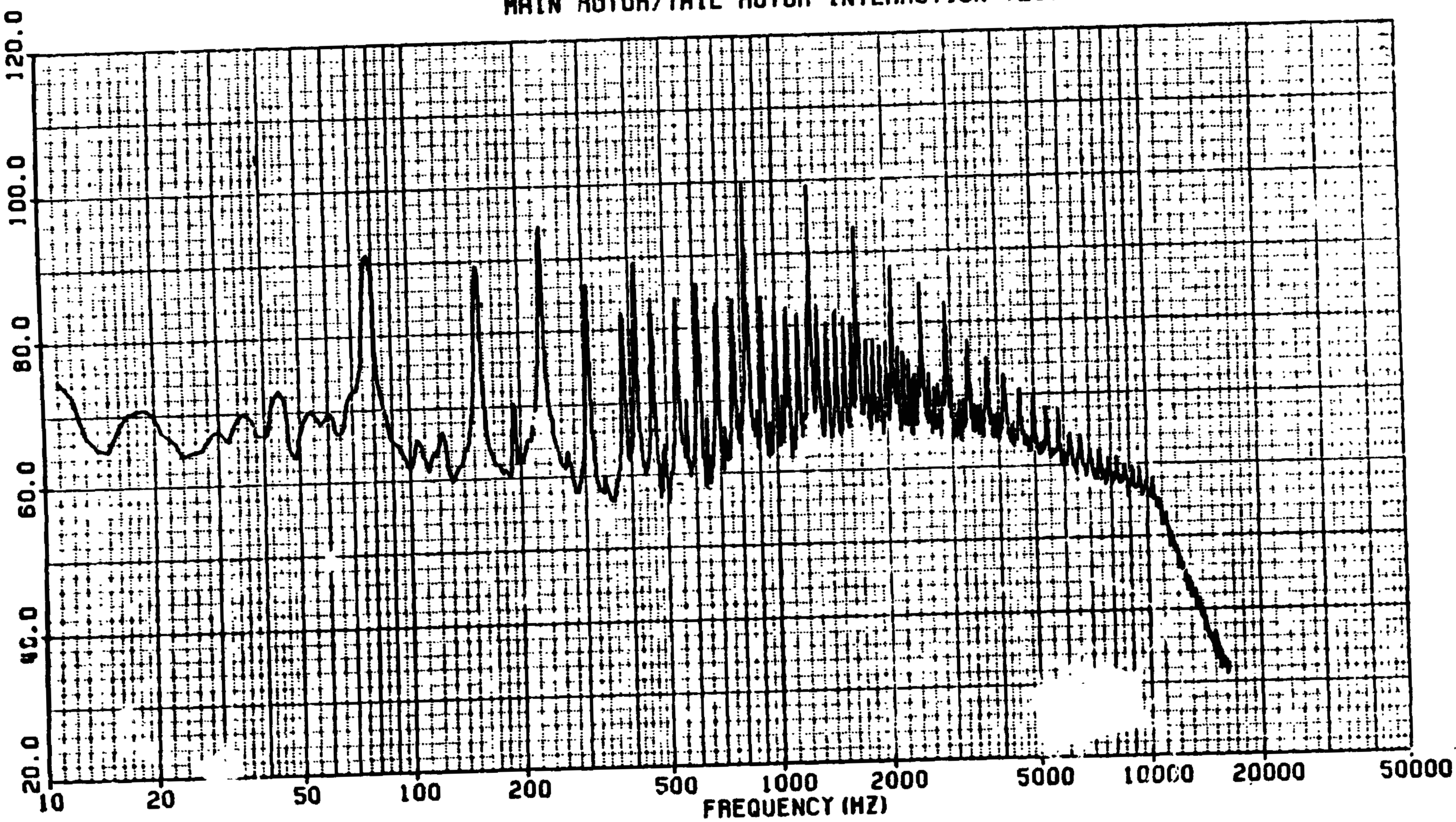


RUN 67 CONF I4PF39 MR 526 N TR 35 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY

SOUND PRESSURE LEVEL (DB)

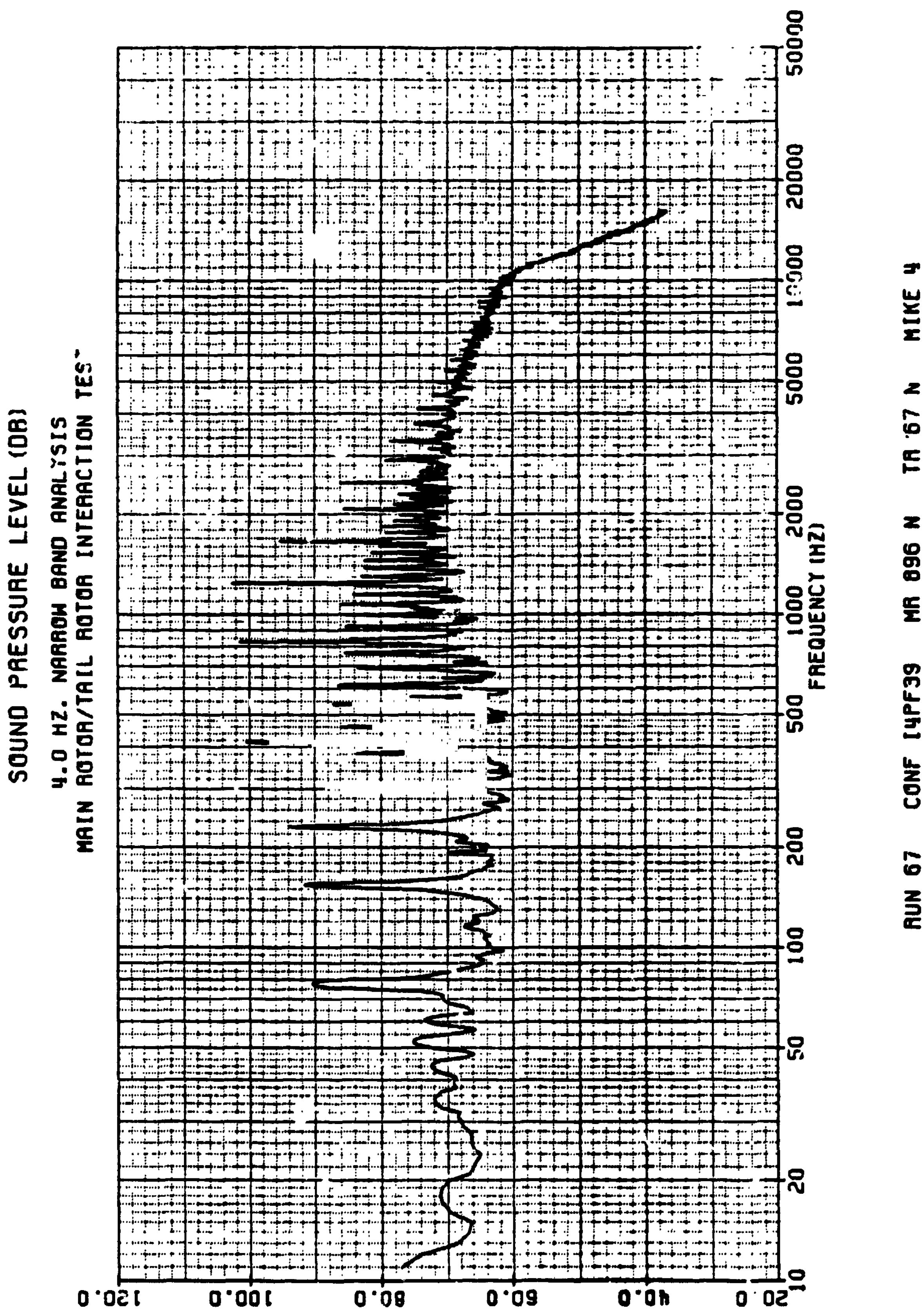
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



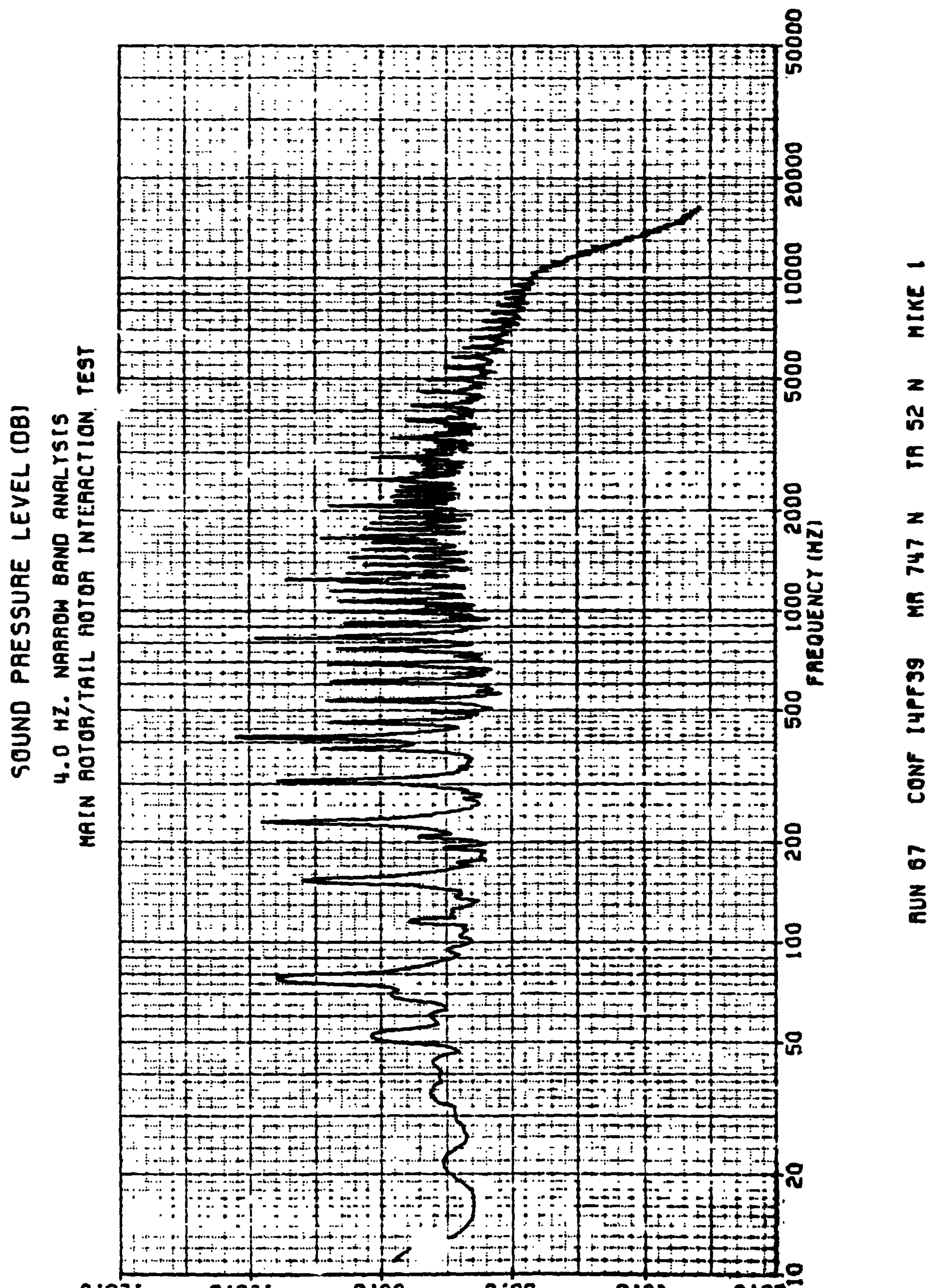
RUN 67 CONF I4PF39 MR 747 N TR 52 N MIKE 4

ORIGINAL PAGE IS OF POOR QUALITY

ORIGINAL PAGE IS
OF POOR QUALITY



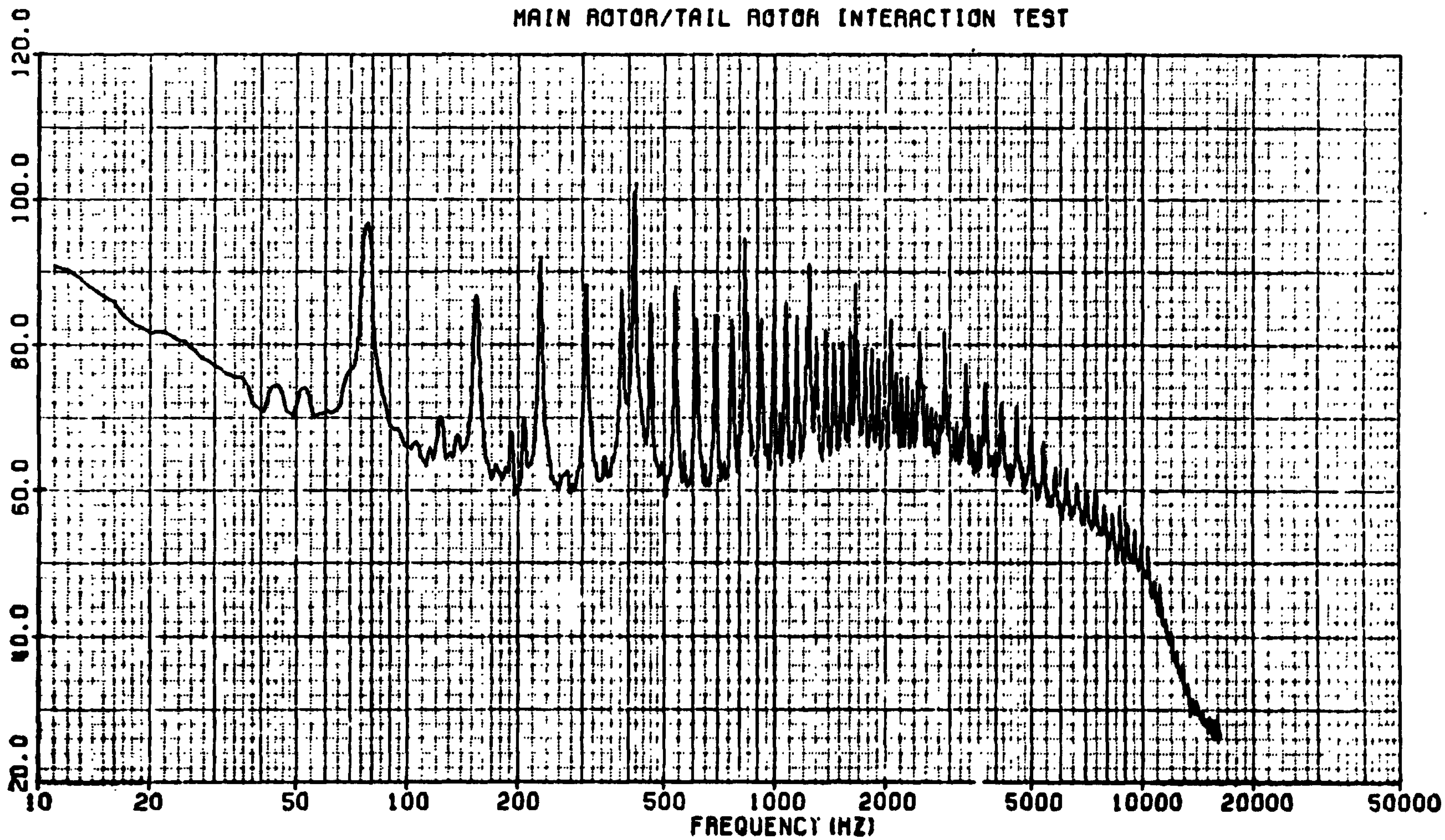
ORIGINAL PAGE IS
OF POOR QUALITY



ORIGINAL PAGE IS
OF POOR QUALITY

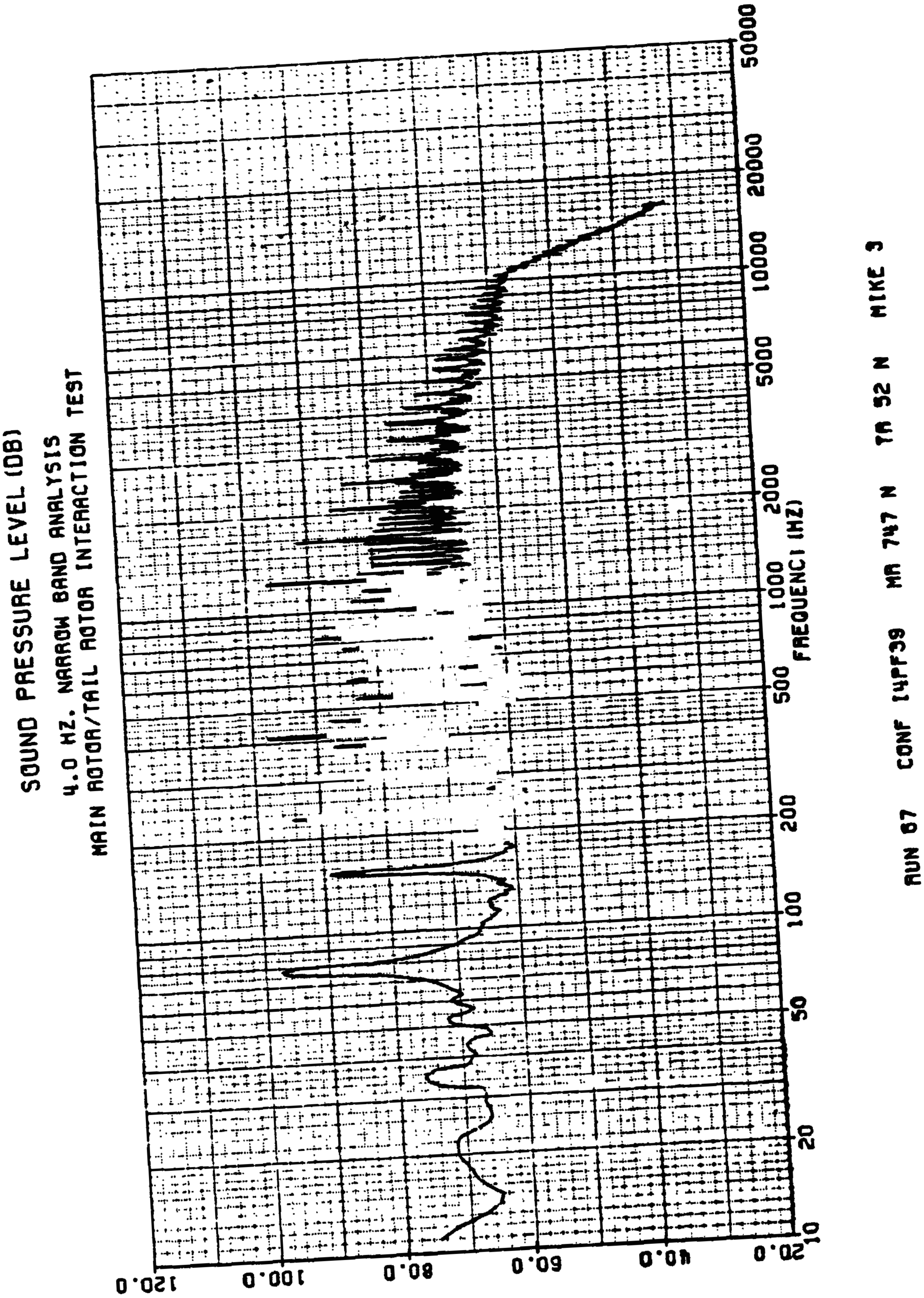
SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST

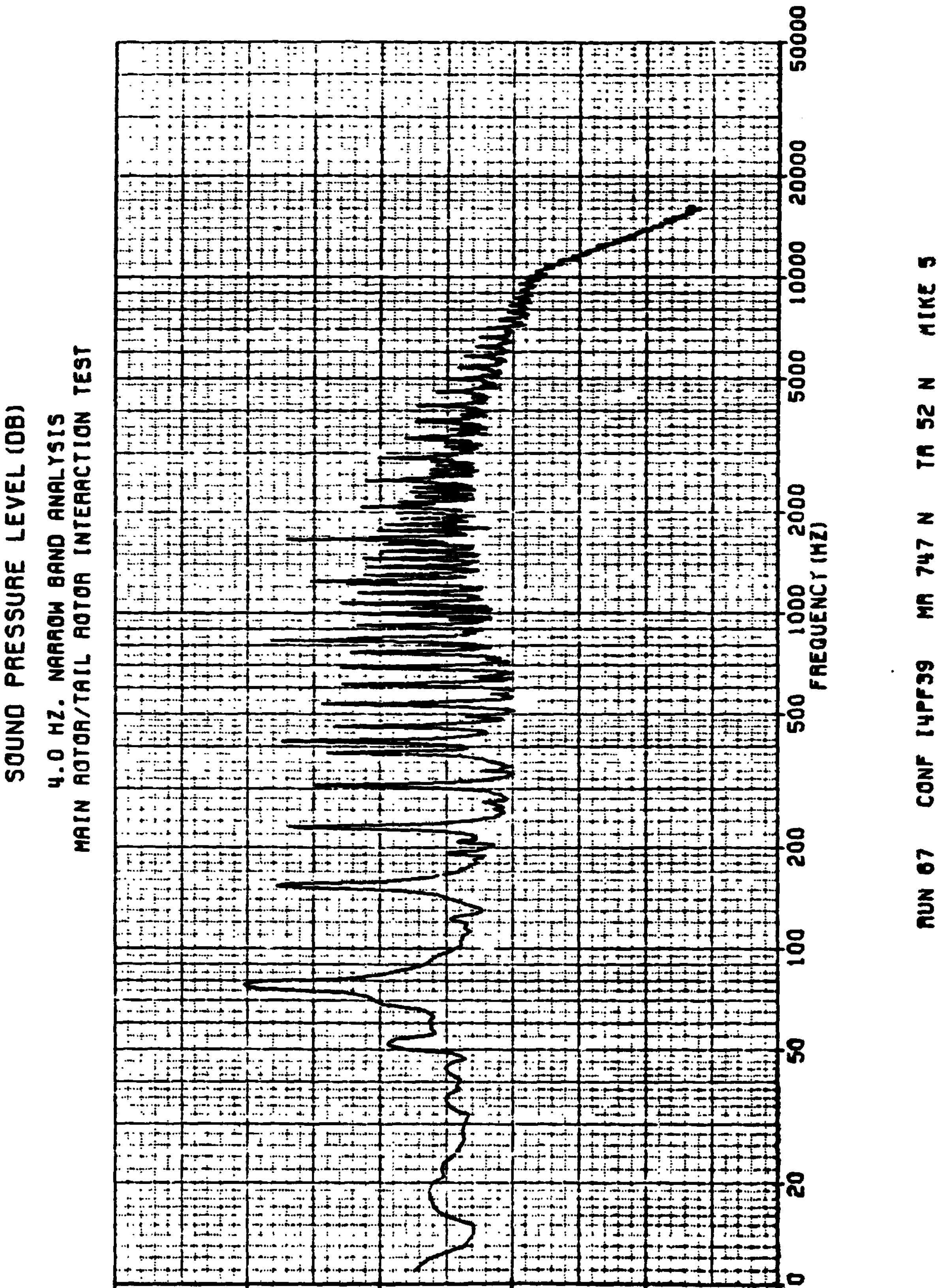


RUN 67 CONF 14PF39 MR 747 N TR 52 N MIKE 2

ORIGINAL PAGE IS
OF POOR QUALITY



ORIGINAL PAGE IS
OF POOR QUALITY

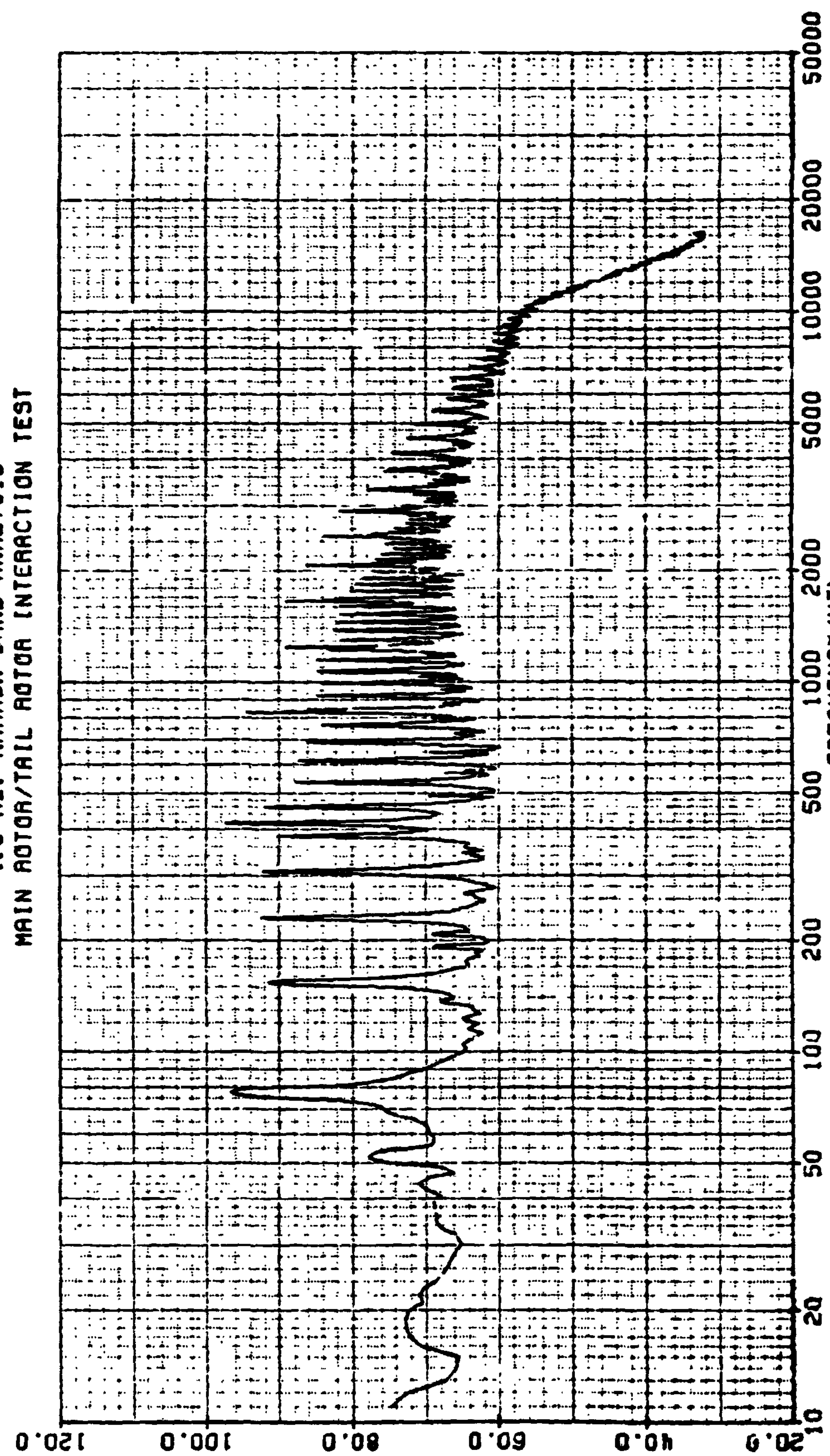


ORIGINAL PAGE IS
OF POOR QUALITY

SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS

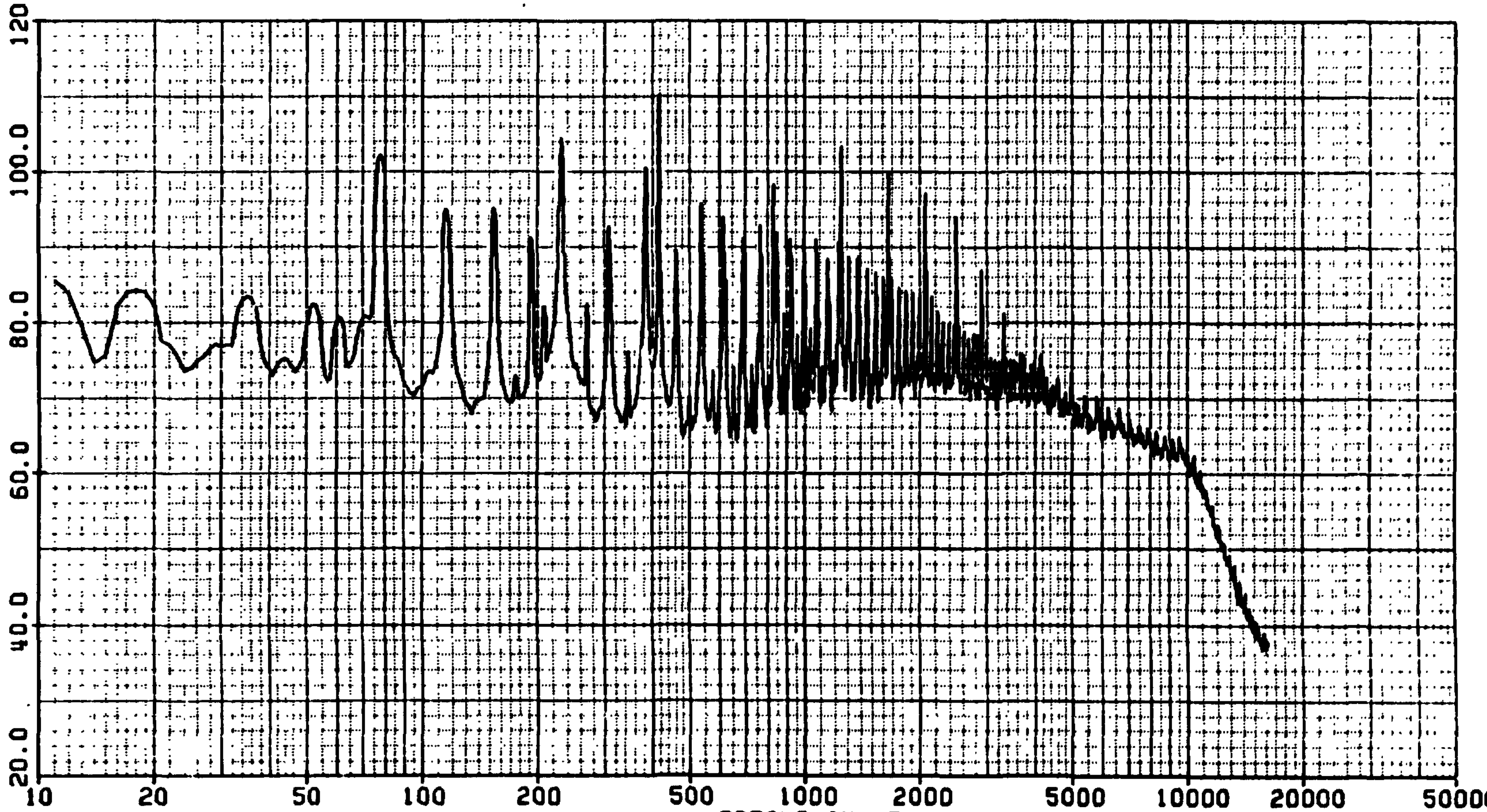
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 67 CONF 14PF39 MA 747 N TR 52 N MIKE 6

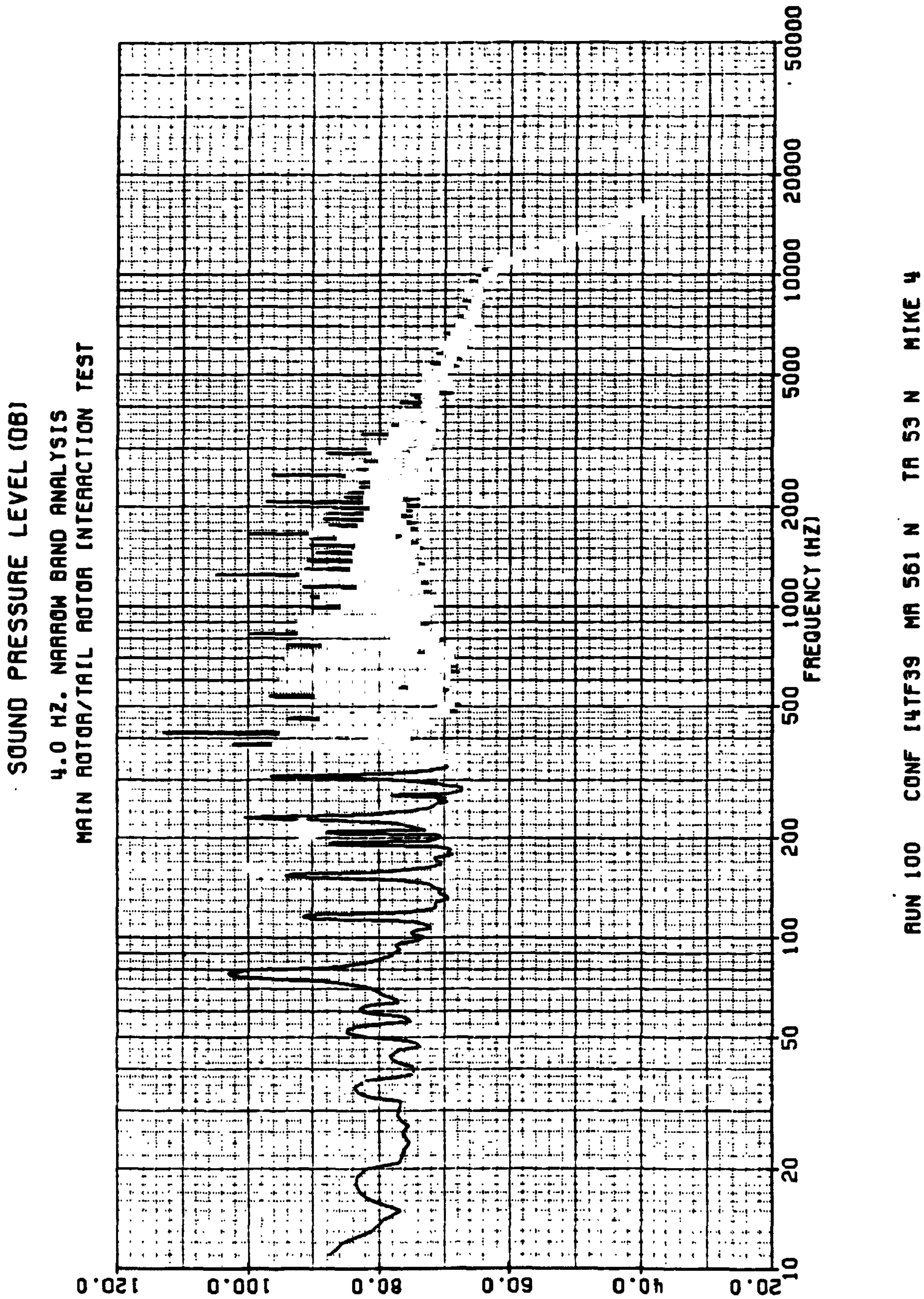
SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



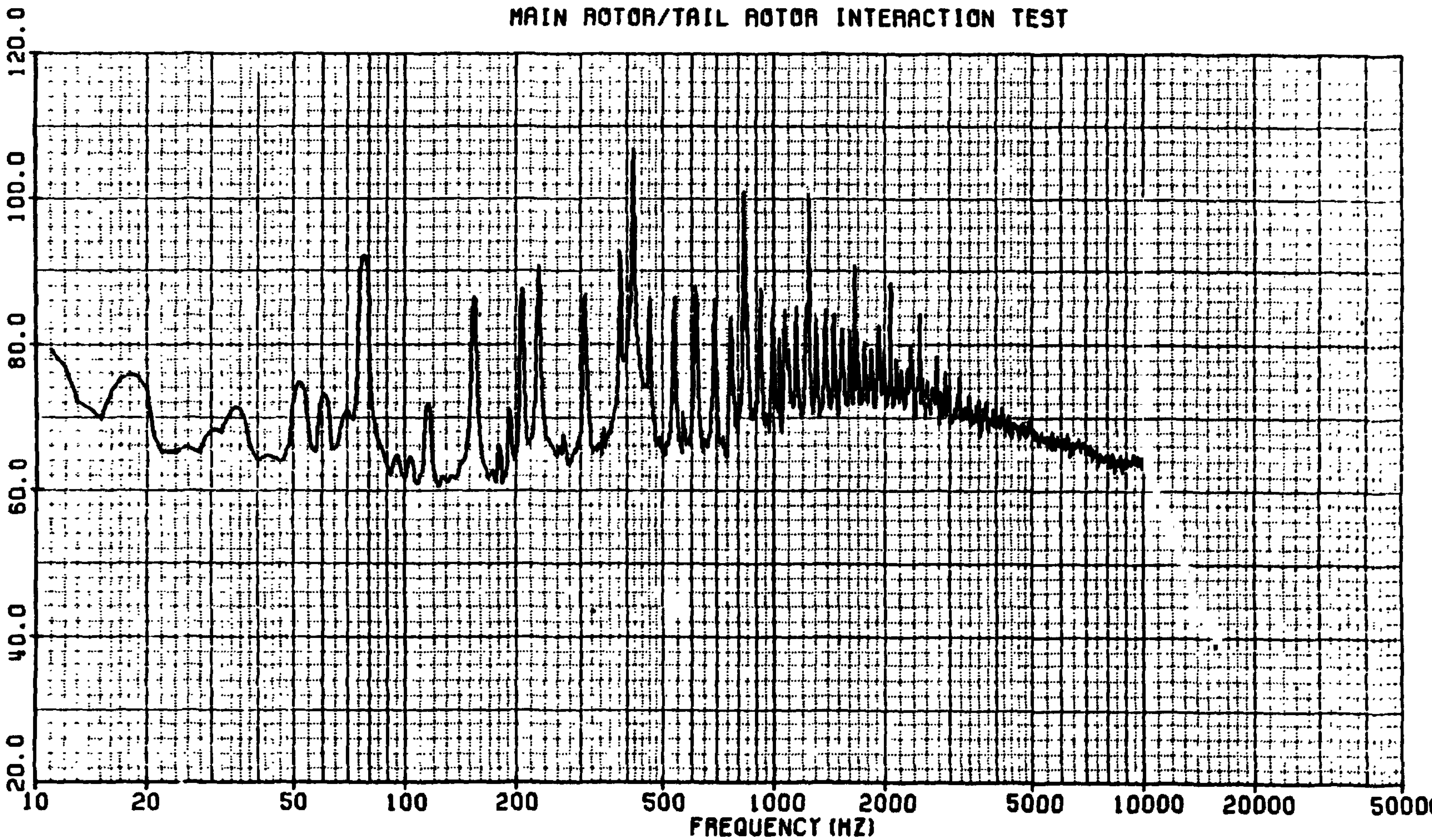
RUN 100 CONF 14TF39 MR 335 N TR 33 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY


SOUND PRESSURE LEVEL (DB)
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST
120.0
100.0
80.0
60.0
40.0
20.0
10
20
50
100
200
500
1000
2000
5000
10000
20000
50000
FREQUENCY (HZ)
RUN 100 CONF 14TF39 MR 561 N TR 53 N MIKE 4

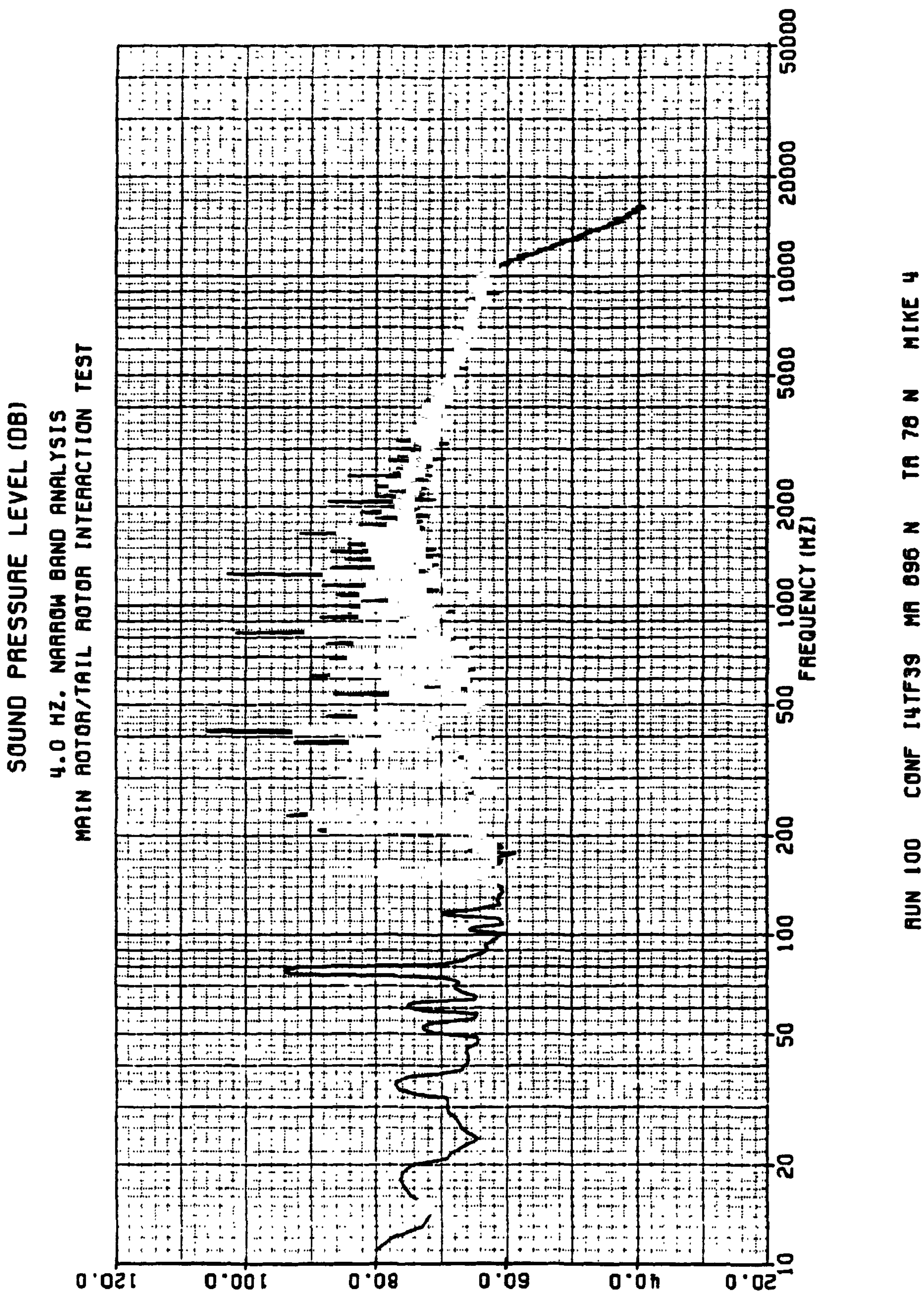
SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



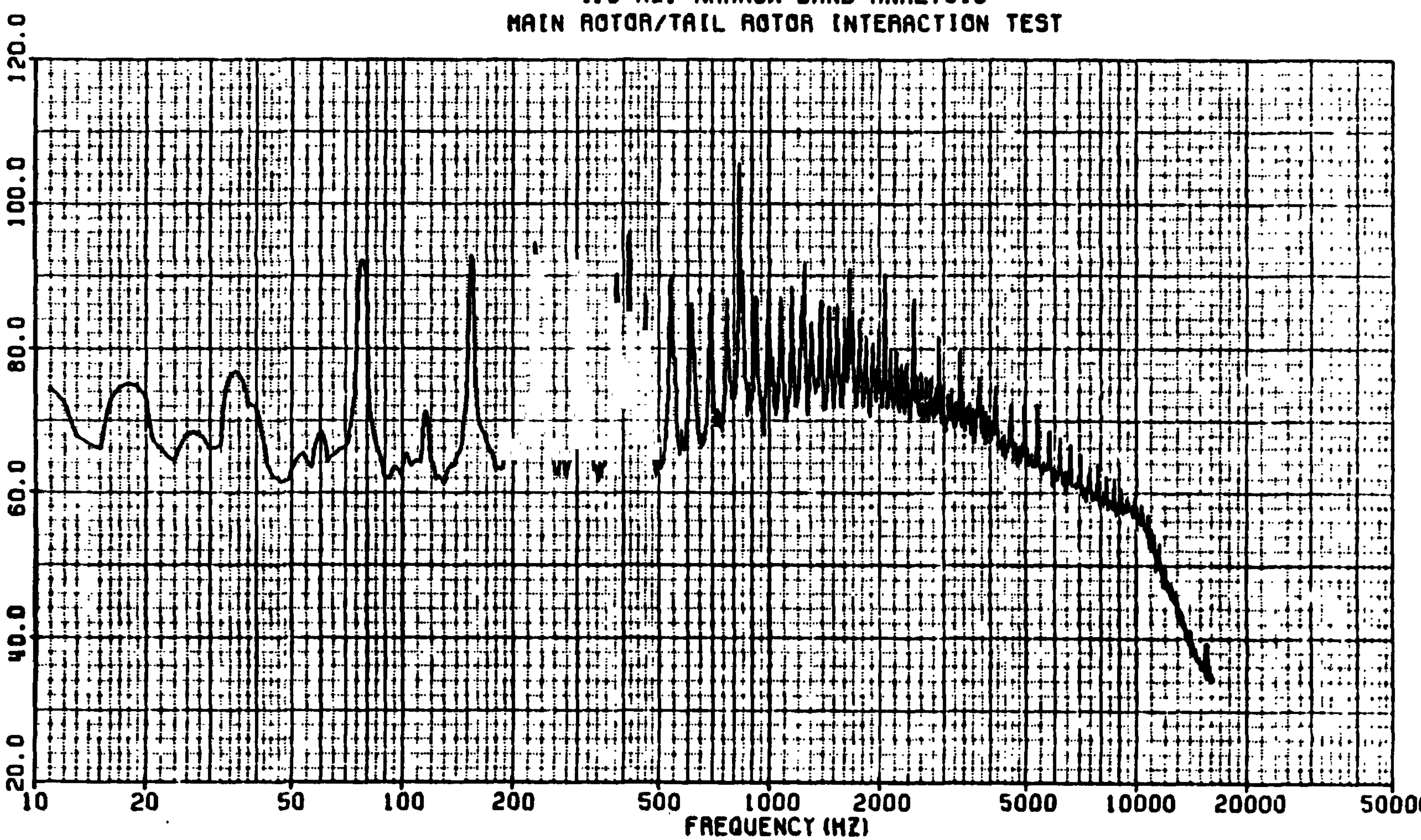
RUN 100 CONF [4TF39 MR 769 N TR 78 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY



SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



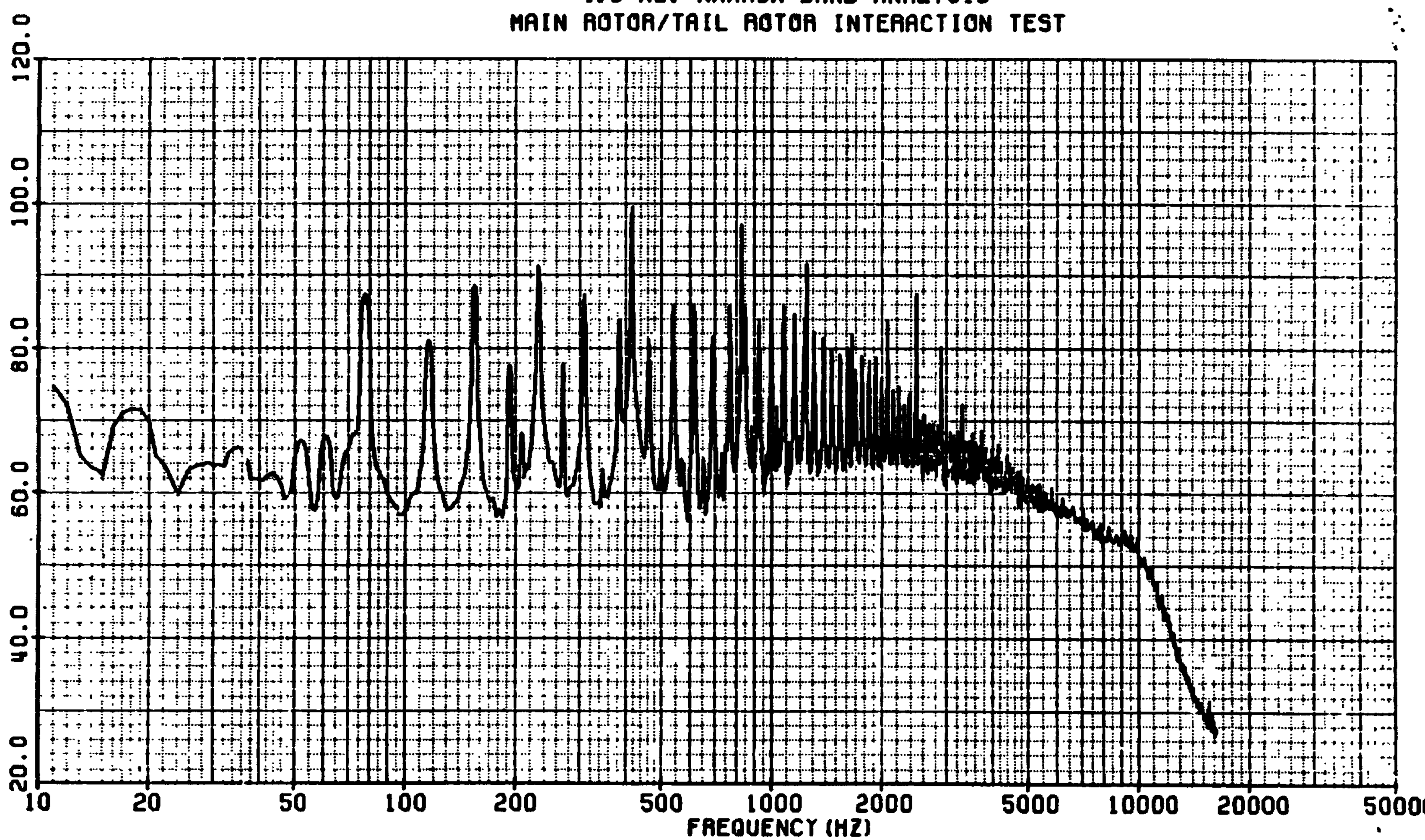
RUN 42 CONF 15PF18 MR 780 N TR 45 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY

SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS

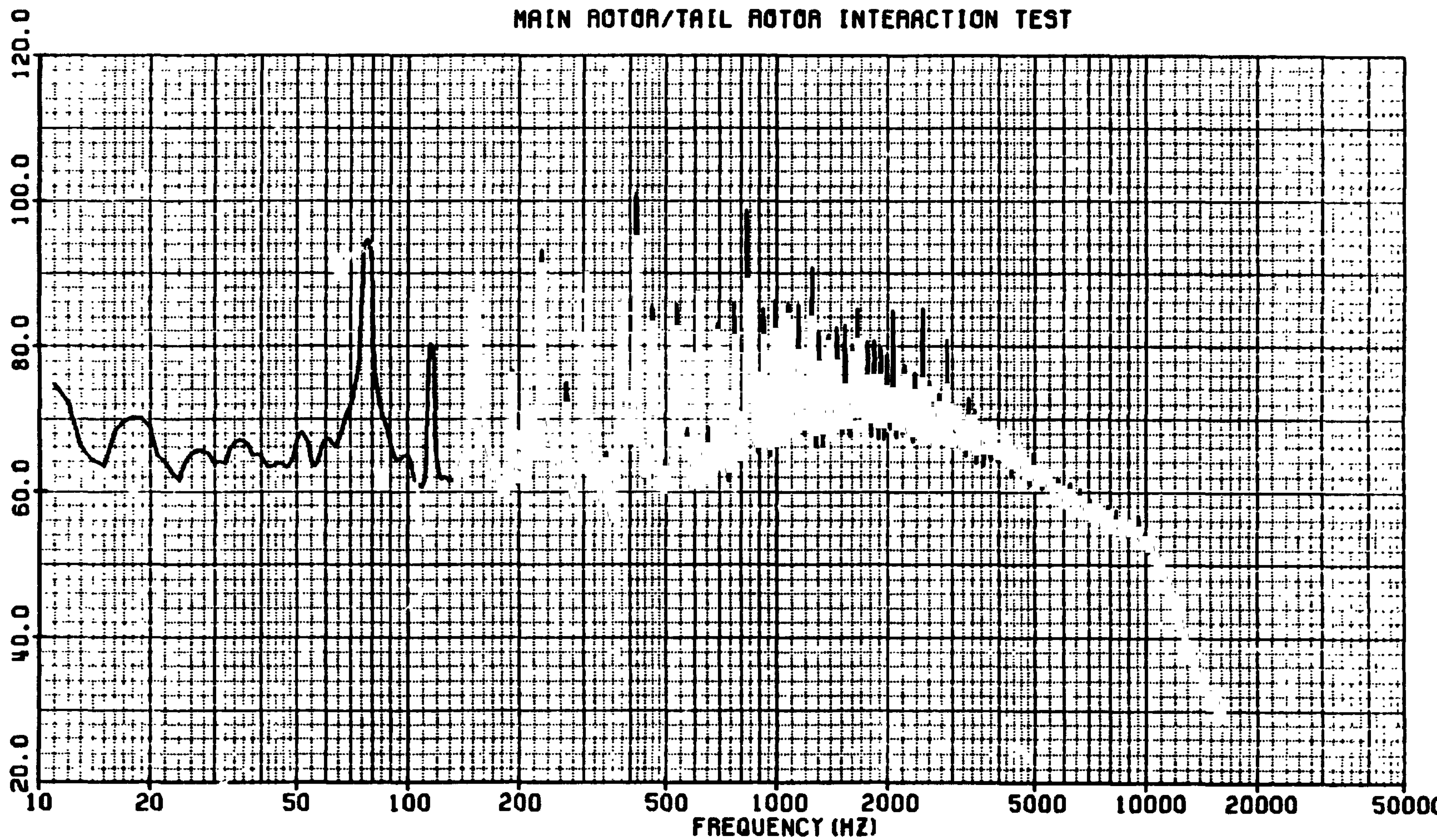
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 96 CONF I7TF39 MR 337 N TR 27 N MIKE 4

SOUND PRESSURE LEVEL (DB)

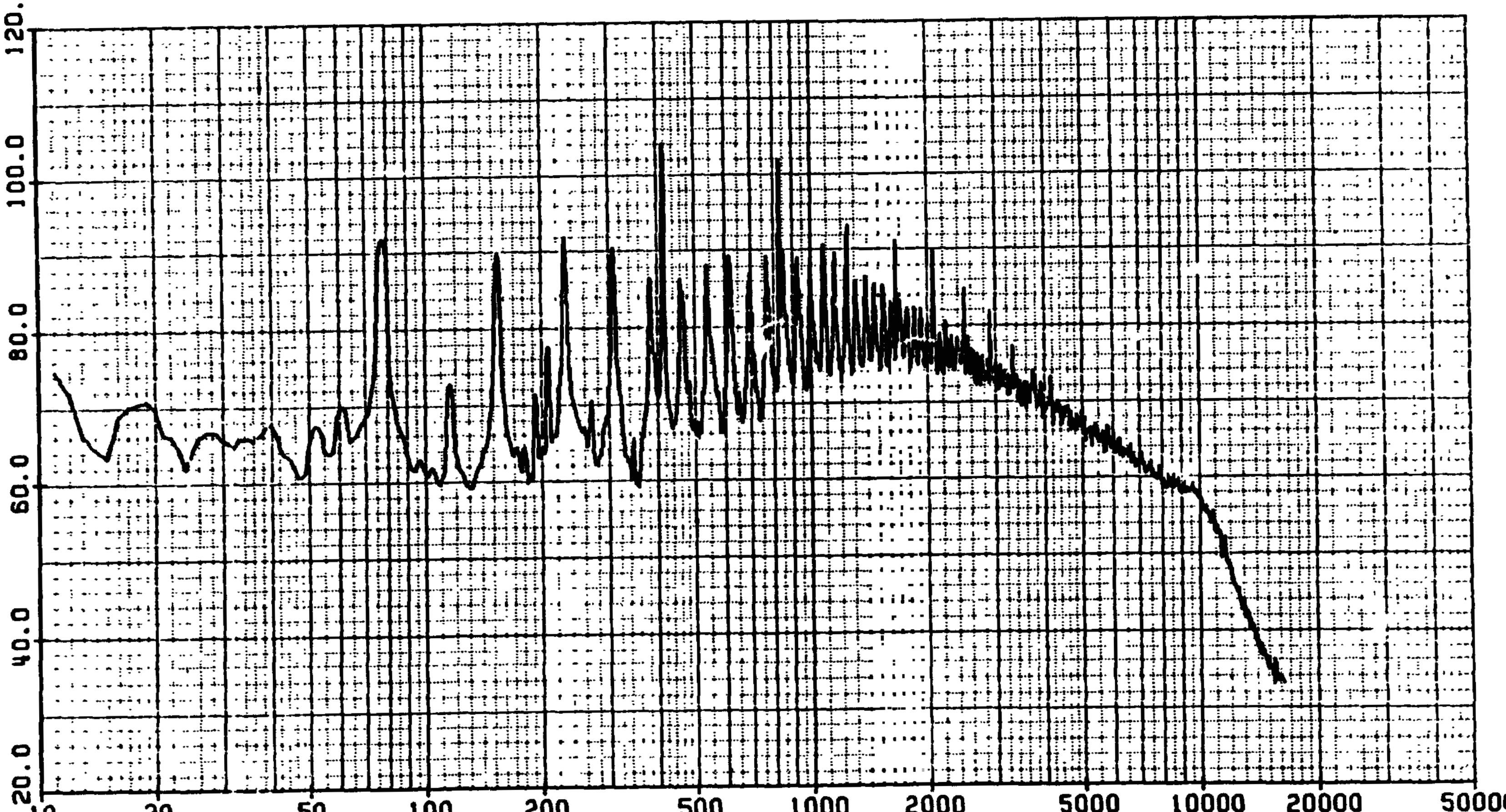
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 96 CONF I7TF39 MR 555 N TR 43 N MIKE 4

SOUND PRESSURE LEVEL (DB)

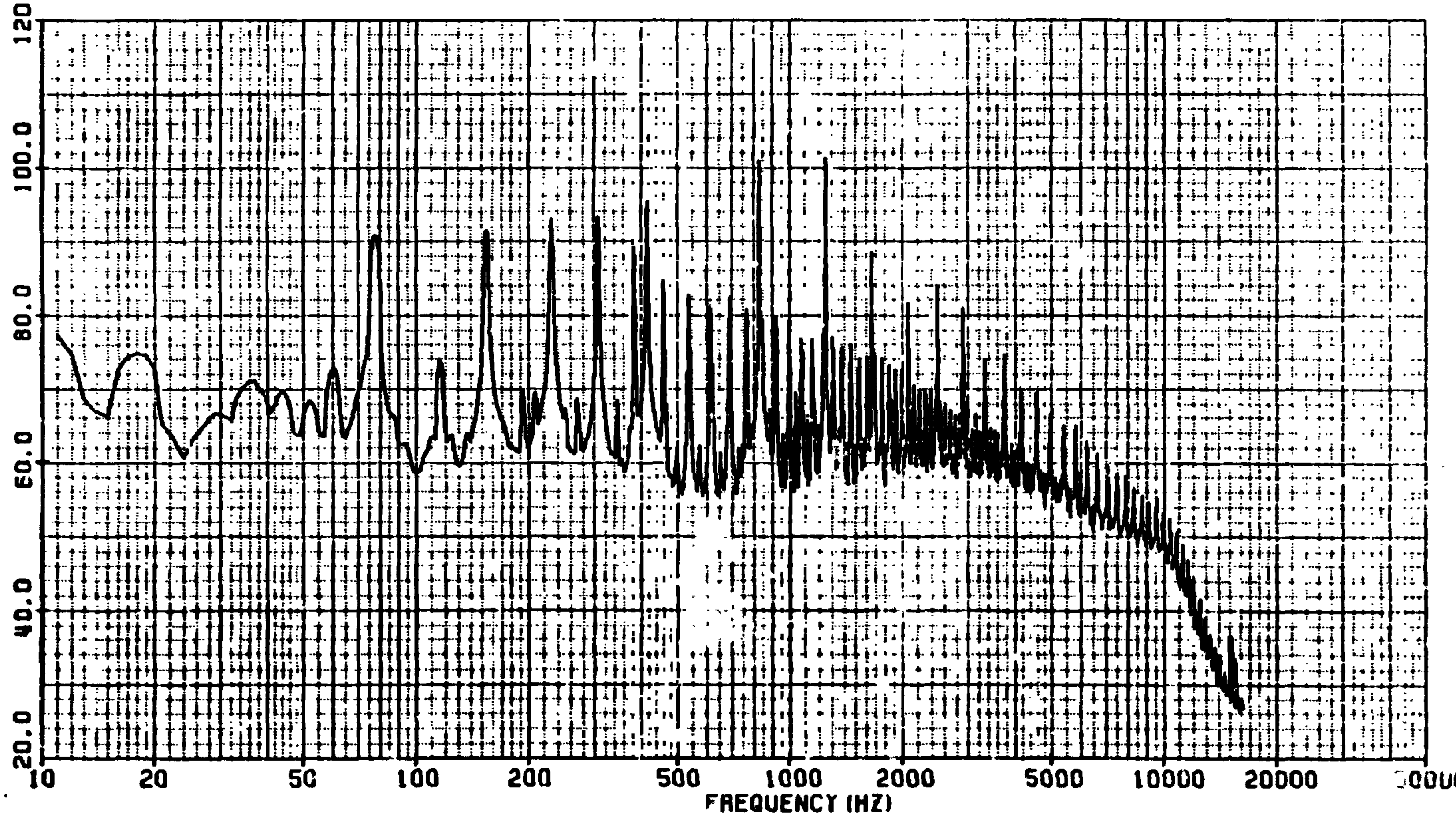
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 96 CONF 17TF39 MR 782 N TR 60 N MIKE 4

SOUND PRESSURE LEVEL (DB)

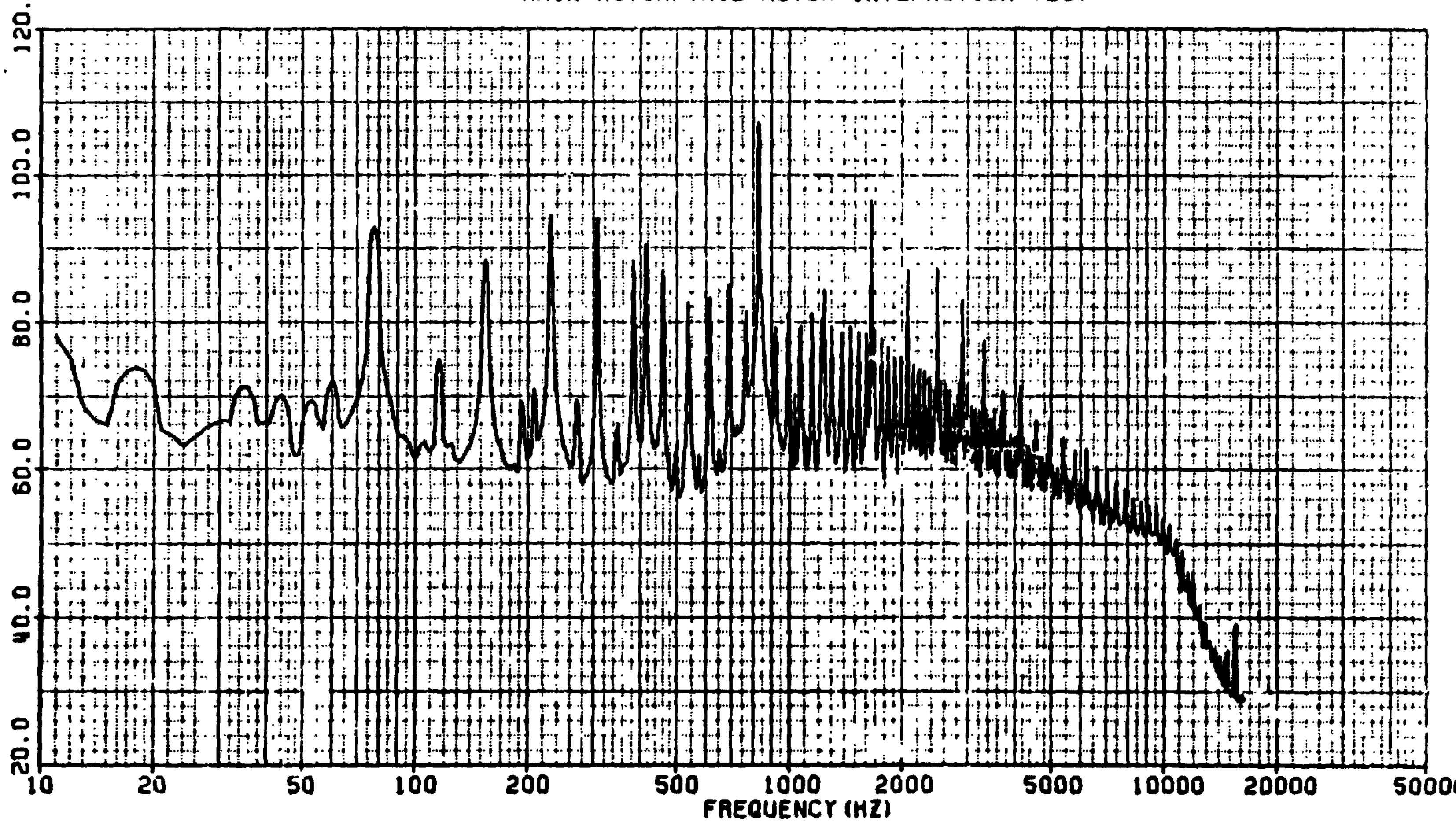
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 64 CONF I8PF3: MR 329 N TR 20 N MIKE 4

SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST

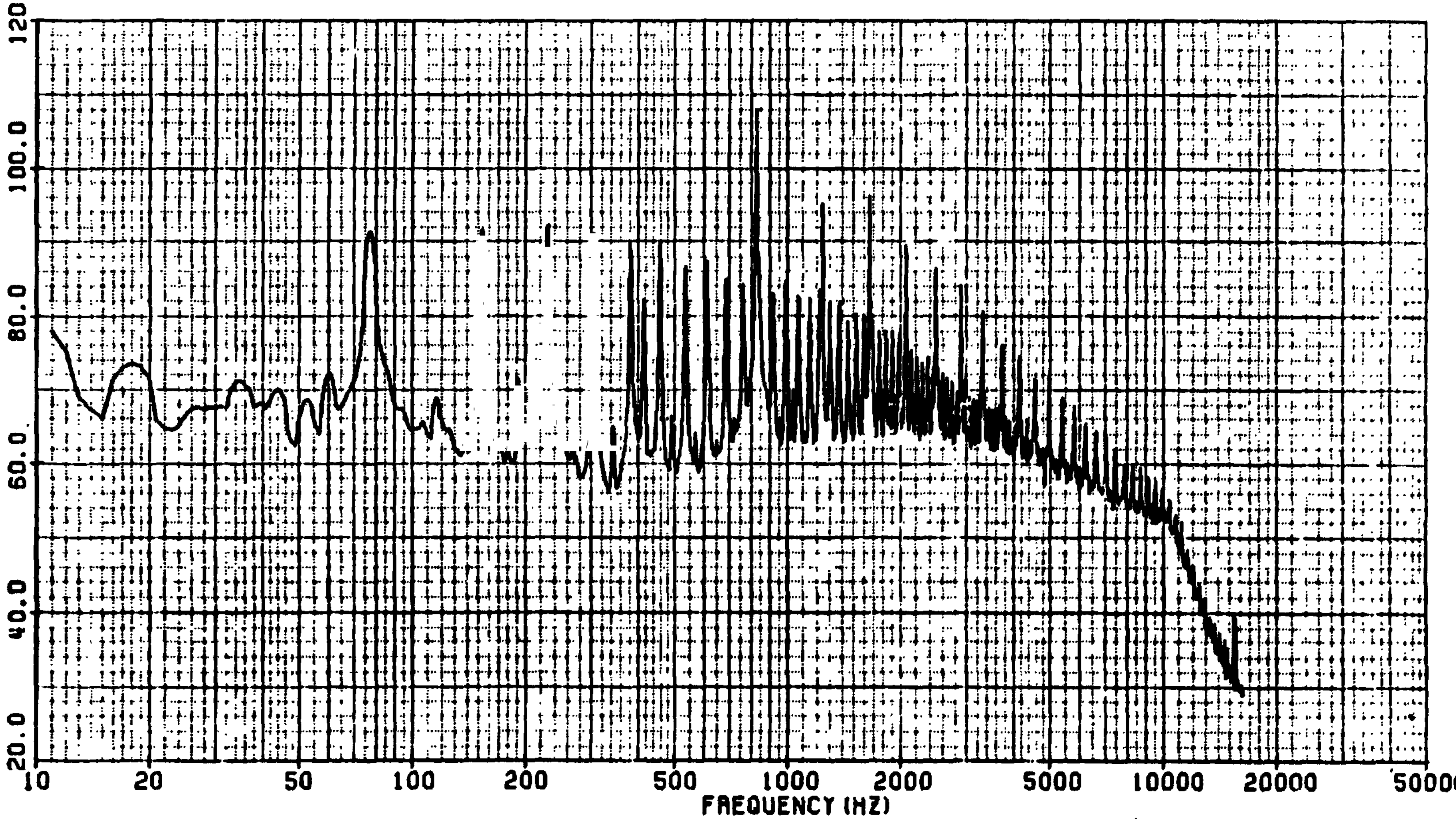


RUN 64 CONF I8PF39 MR 545 N TR 34 N MIKE 4

SOUND PRESSURE LEVEL (DB)

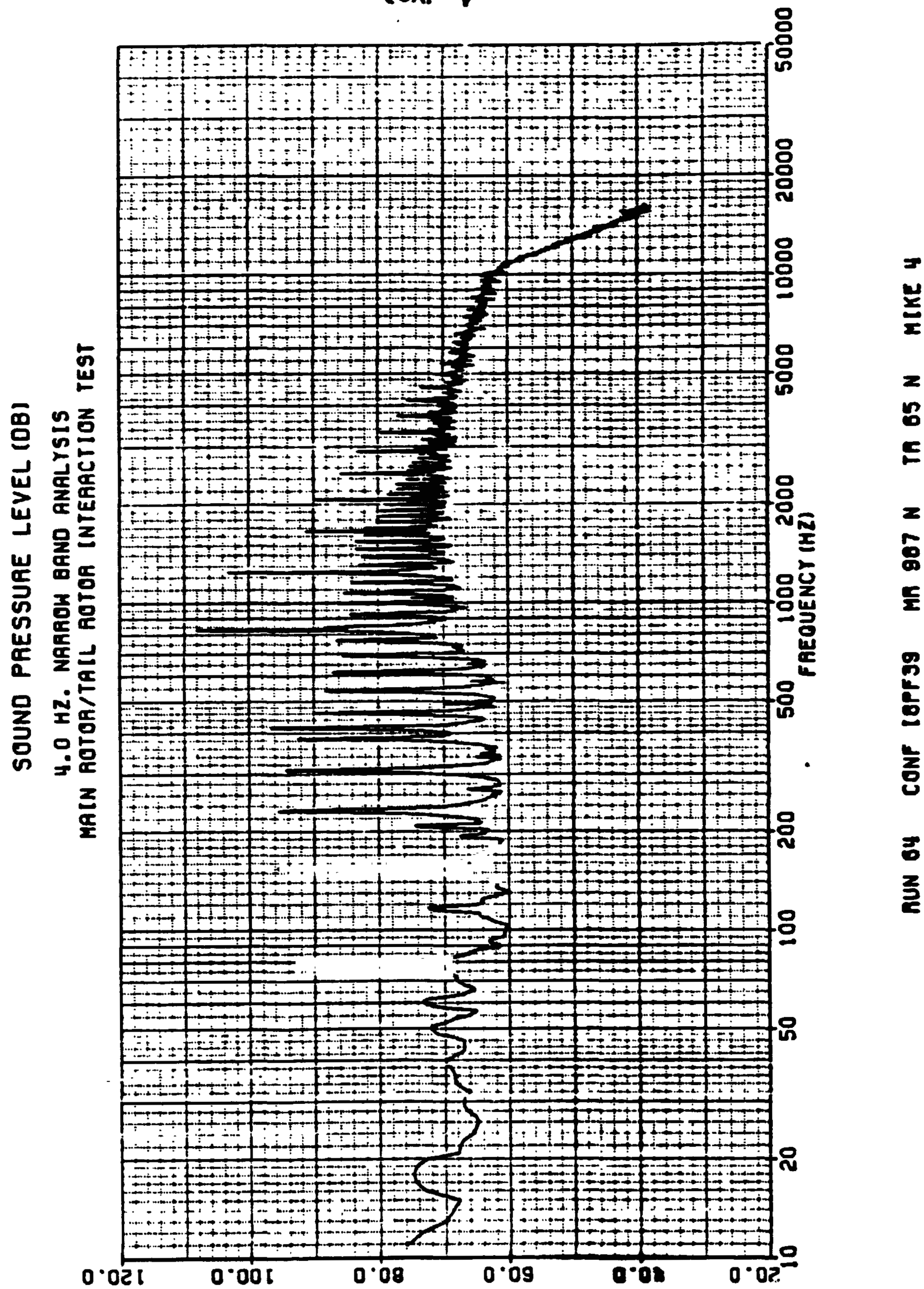
4.0 HZ. NARROW BAND ANALYSIS

MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 64 CONF I8PF39 MR 783 N TR 47 N MIKE 4

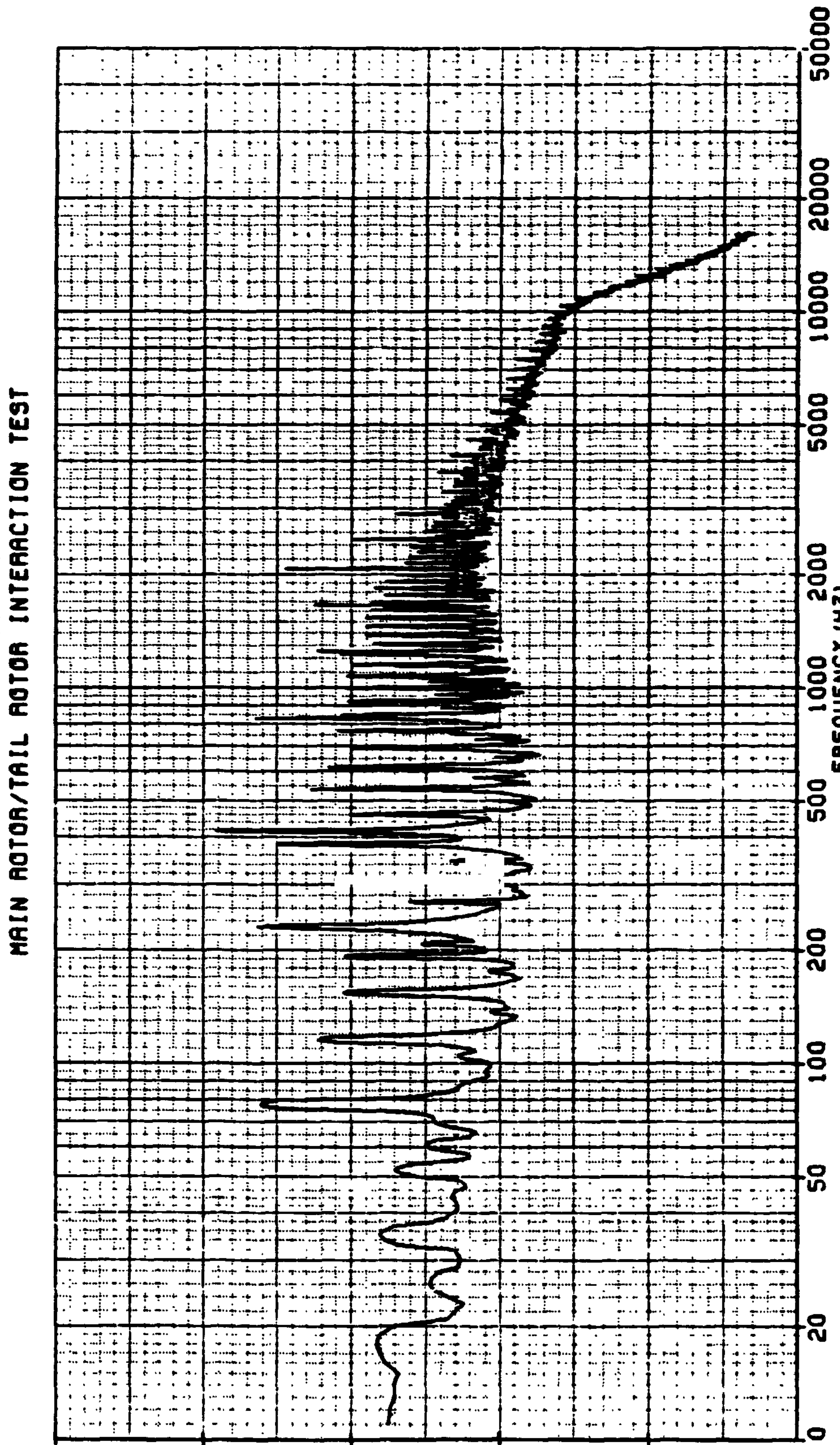
ORIGINAL PAGE IS
OF POOR QUALITY


SOUND PRESSURE LEVEL (DB)
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST
120.0
100.0
80.0
60.0
40.0
20.0
10
20
50
100
200
500
1000
2000
5000
10000
20000
50000
FREQUENCY (HZ)
RUN 64 CONF 18PF39 MR 987 N TR 65 N MIKE 4

SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS

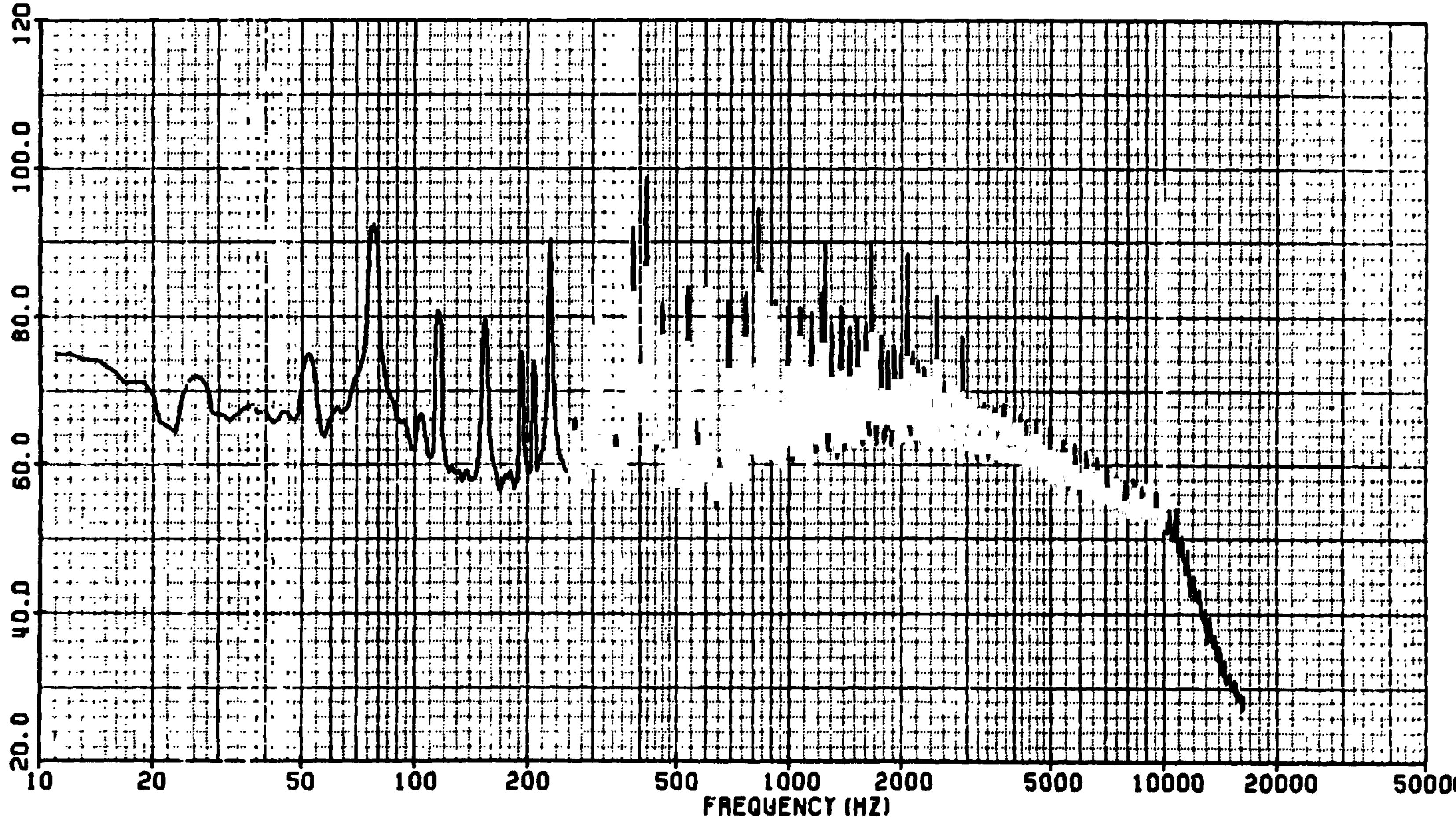
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 101 CONF 18TF39 MR 328 N TR 26 N MIKE 4

SOUND PRESSURE LEVEL (DB)

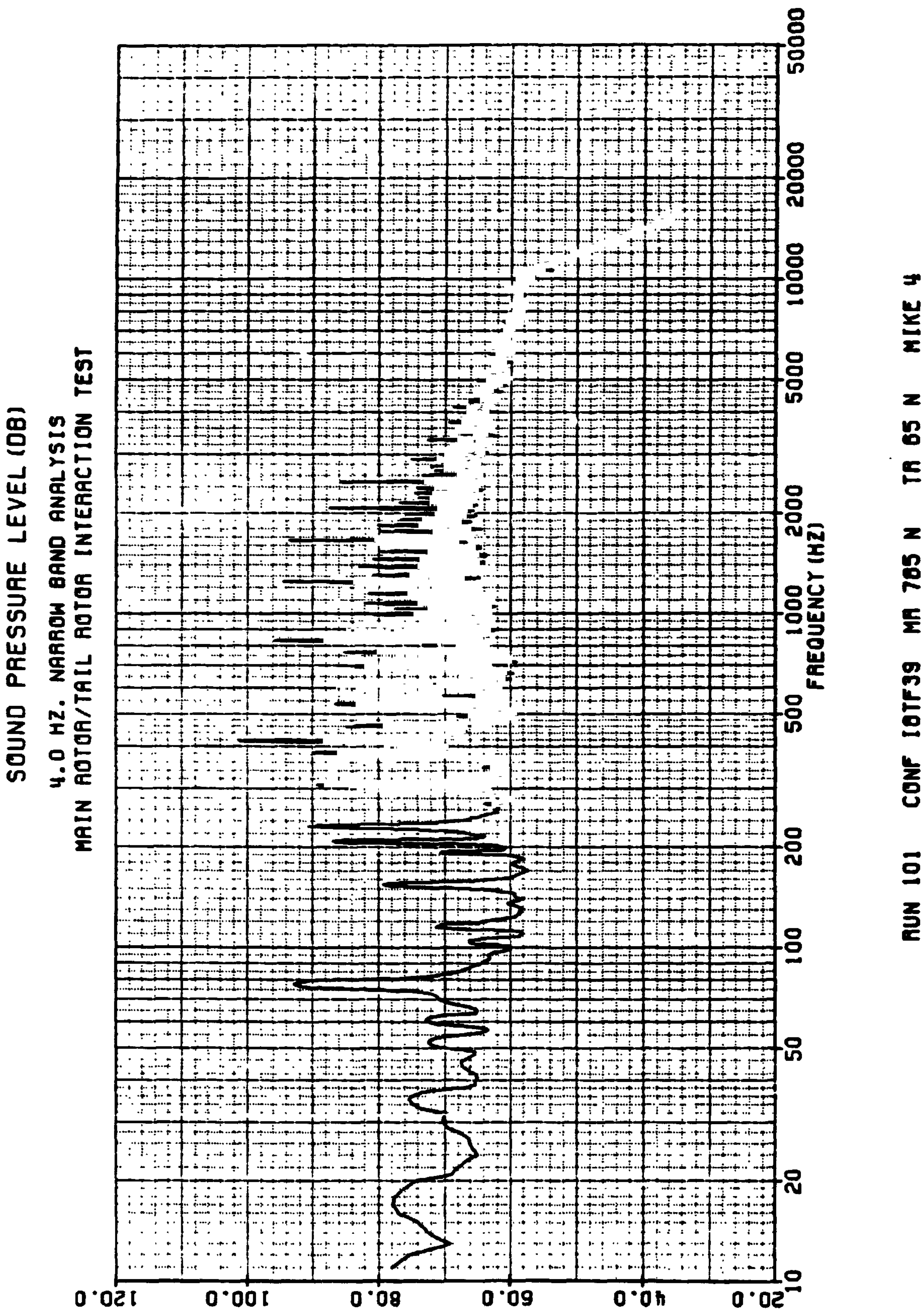
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 101 CONF 18TF39 MR 546 N TR 42 N MIKE 4

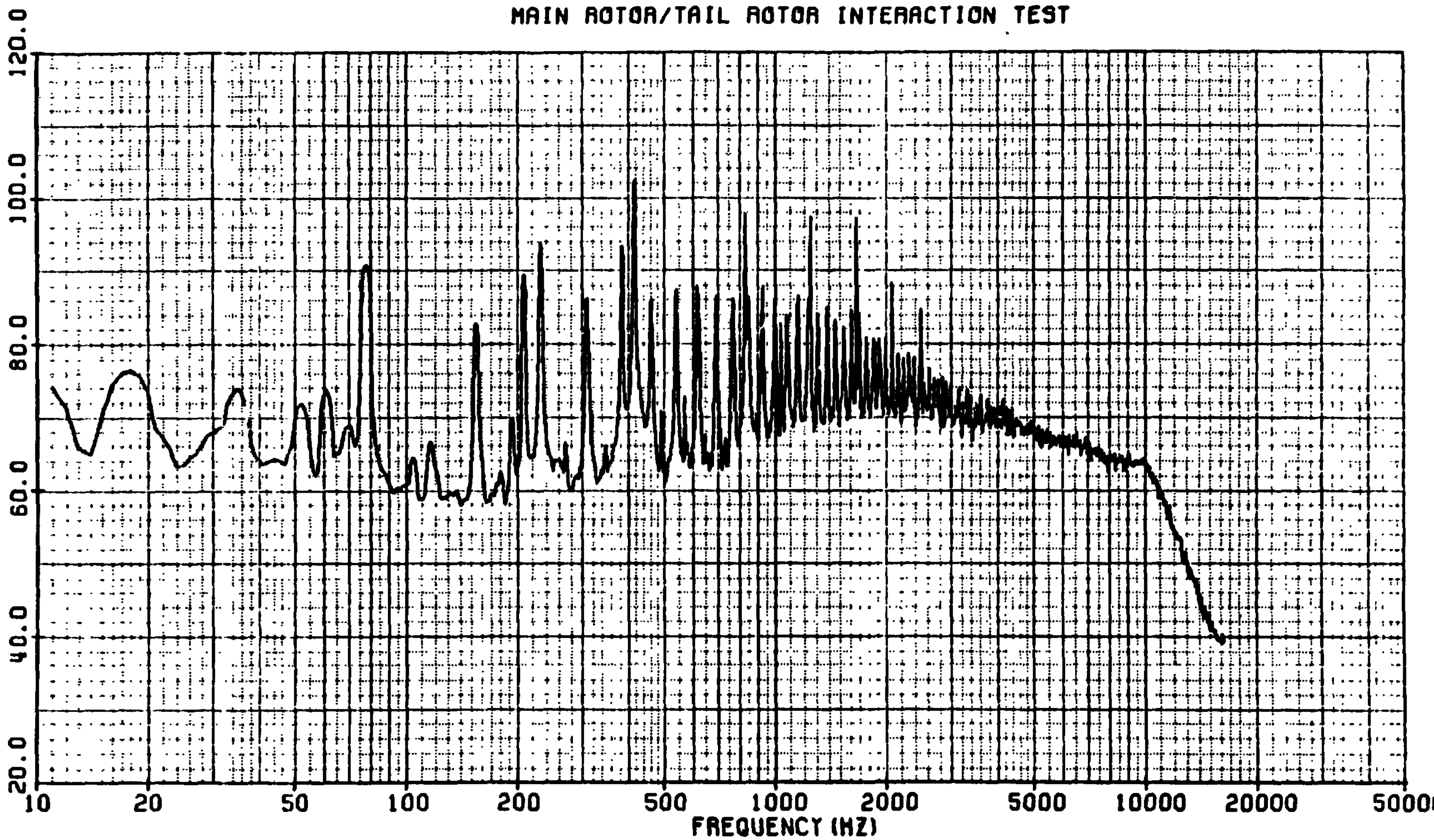
ORIGINAL PAGE IS
OF POOR QUALITY

ORIGINAL PAGE IS
OF POOR QUALITY



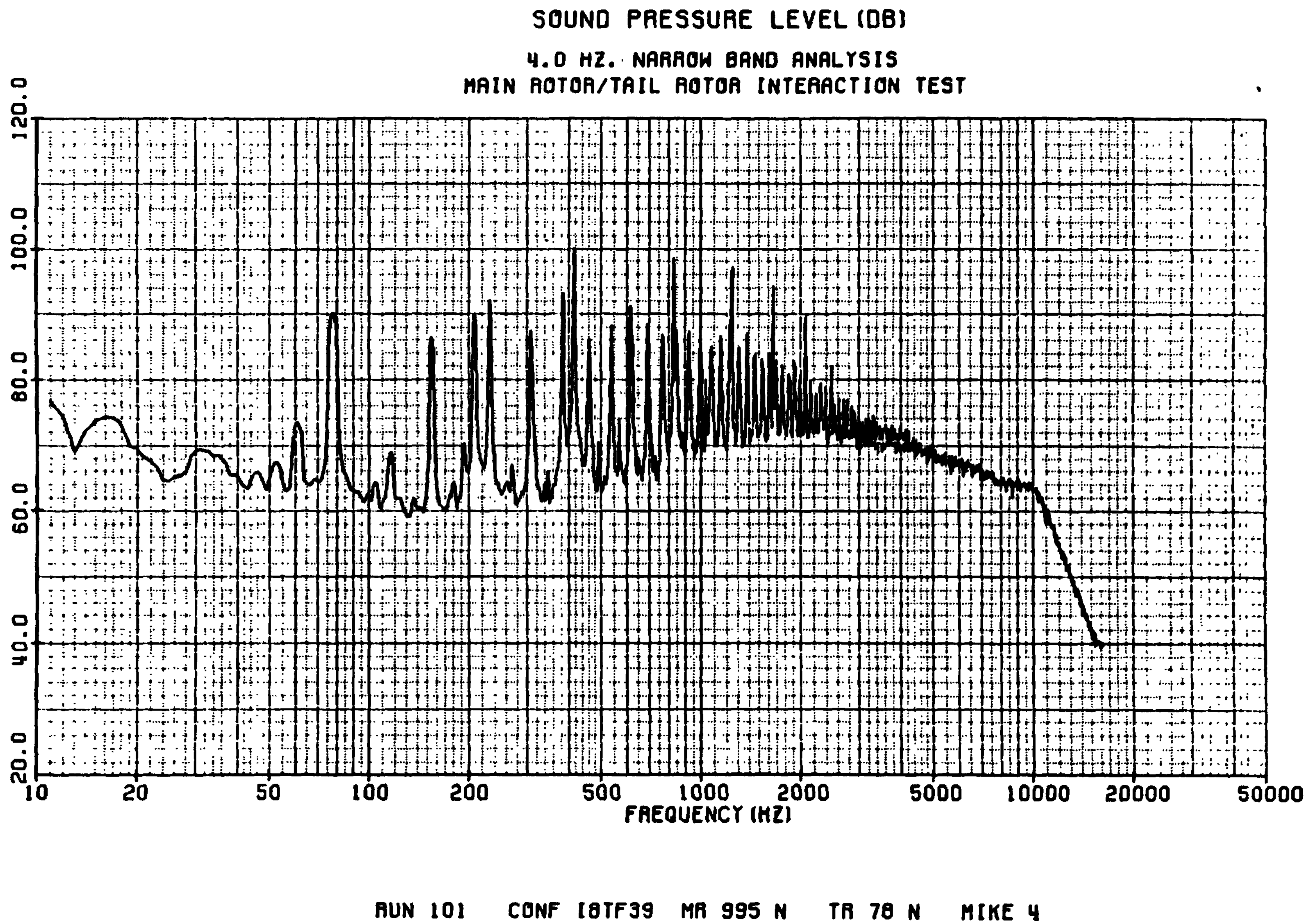
SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 101 CONF 18TF39 MR 883 N TR 79 N MIKE 4

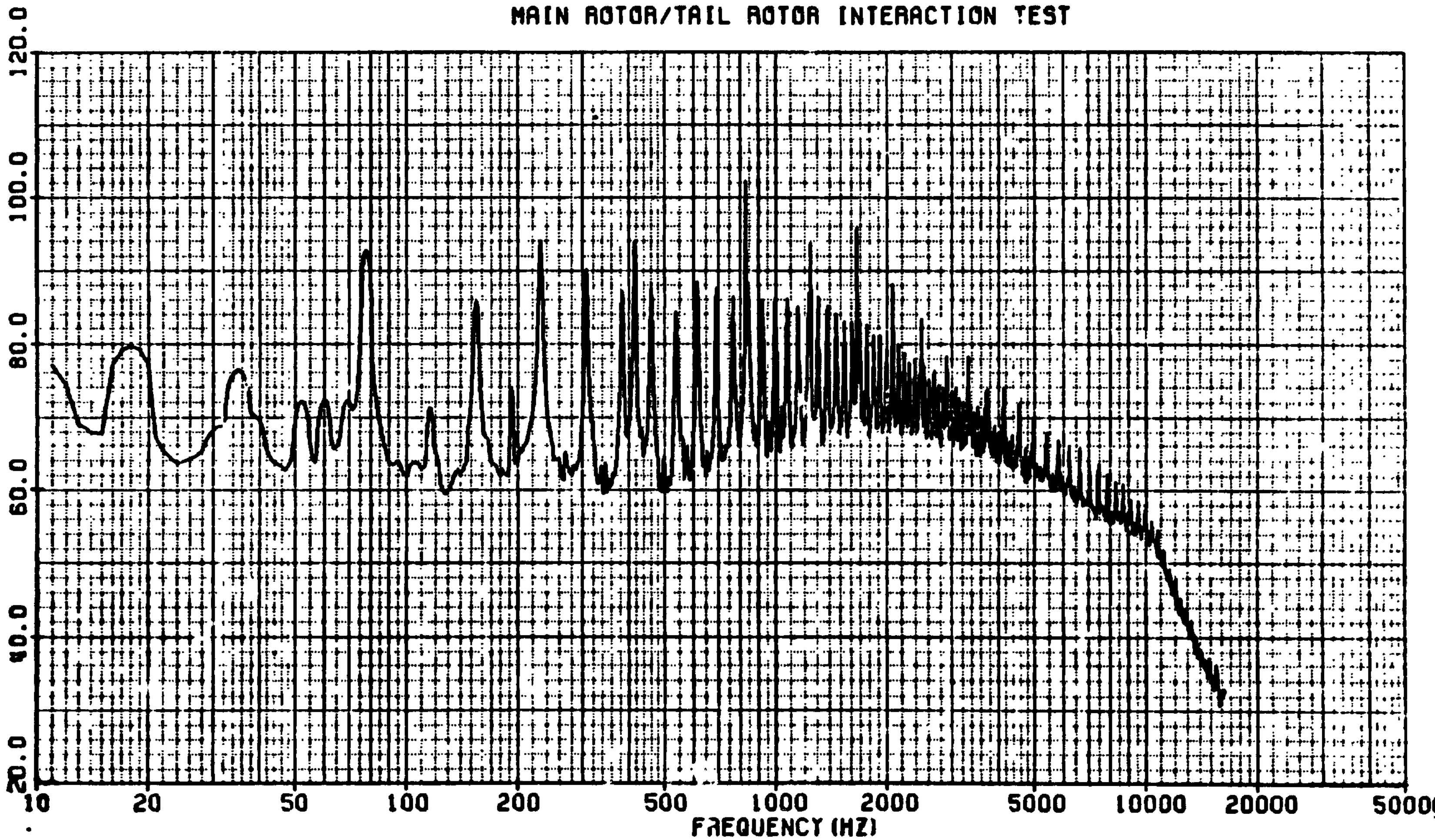
ORIGINAL PAGE IS
OF POOR QUALITY


SOUND PRESSURE LEVEL (DB)
4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST
120.0
100.0
80.0
60.0
40.0
20.0
10
20
50
100
200
500
1000
2000
5000
10000
20000
50000
FREQUENCY (HZ)
RUN 101 CONF I8TF39 MR 995 N TR 78 N MIKE 4

ORIGINAL PAGE IS
OF POOR QUALITY

SOUND PRESSURE LEVEL (DB)

4.0 HZ. NARROW BAND ANALYSIS
MAIN ROTOR/TAIL ROTOR INTERACTION TEST



RUN 40 CONF I9PF18 MR 780 N TR 45 N MIKE 4